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Opuscula Philolichenum

small works in the field of lichenology

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MISSION

Opuscula Philolichenum is intended to serve as a venue for the publication of small works in the field of lichenology (including lichenicolous fungi and non-lichenized fungi traditionally treated with lichens). The central goal of the journal is to provide timely publication, in a professional format, free of charge to authors and readers. While the journal focuses on topics relating to the lichen biota of North America this is by no means exclusive and manuscripts on other topics will be considered as the table of contents of the present issue clearly illustrates.

Authors wishing to submit a manuscript for publication in *Opuscula Philolichenum* should contact the editor prior to submission to confirm that the paper conforms to the mission of the journal (outlined above). Manuscript submissions should be left unformatted and authors should consult a recent issue of *Opuscula Philolichenum* for style. All submissions are subjected to review by at least two peer reviewers and, following acceptance are formatted by the editor.

NOTICE FROM THE EDITOR

When this journal began publication ten years ago it was among the first serials to take advantage of the internet when publishing new botanical nomenclatural acts. The journal was conceived as a primarily electronic one, available on-line free of charge (at http://sweetgum.nybg.org/philolichenum/), with a limited print run to satisfy the requirements for effective publication established under the *International Code for Botanical Nomenclature*. Since that time we have continued to publish the journal in this manner, printing one or two issues a year, with each issue consisting of between one and two hundred pages.

In 2004 we could not have foreseen the revolutionary changes that took place at the 18th International Botanical Congress in Melbourne. There the Nomenclature Section voted to allow electronic only publication of new nomenclatural acts beginning 1 January 2012. In response to this change *Opuscula Philolichenum* no longer produces hardcopy. Although a single printed copy will continue to be deposited in the library of The New York Botanical Garden.

Beginning with volume number 12 of *Opuscula Philolichenum*, manuscripts are published electronically on-line in PDF/A format immediately following the approval of the authors in the post-review proof stage. The PDF issued online is considered to be the final version (= version of record) and the date on which the PDF is posted is considered to be the date of effective publication. In order to aid future workers the date of effective publication for each manuscript is provided in the table of contents. When a new manuscript is published online a record is also simultaneously transmitted to the organizers of *Recent Literature on Lichens* for inclusion in that database.

Table of Contents

Front Matter i-v.

effectively published online 26 January 2015:

Lücking, R.
Thelotremoid Graphidaceae from the NYBG Herbarium: New species, range extensions and a forgotten lichen. 1-57.

effectively published online 2 February 2015:

Lücking, R.
Erratum: Valid publications of two combinations invalidly published in Opuscula Philolichenum 14: 1-57. 58.

effectively published online 11 March 2015:

Lendemer, J.C.
Lichens of Eastern North America Exsiccati, Fascicle X, Nos. 446-482. 59-65.

effectively published online 19 March 2015:

Morse, C. & D. Ladd.
Lichenes Exsiccati Magnicamporum Fascicle 1, with comments on selected taxa. 66-81.

effectively published online 11 May 2015:

Zhurbenko, M.P., J. Etayo, K. Federowitz & G. Thor.
Miscellaneous reports of lichenicolous fungi from Argentina including the new species *Didymellopsis nephromatis*. 82-89.

effectively published online 27 May 2015:

Knudsen, K. & A. Nordin.
Lectotypification of *Acarospora trachytica* Jatta (Acarosporaceae), a rare species from Italy. 90-92.

effectively published online 29 May 2015:

McMullin, R.T., J.R. Maloles & S.G. Newmaster.
New and interesting lichens from Ontario, Canada - II. 93-108.

effectively published online 22 June 2015:

McMullin, R.T.
A review of *Physconia subpallida* in Canada. 109-115.

effectively published online 26 June 2015:

Lendemer, J.C. & R.C. Harris.
A nomenclatural note on *Mycoporum biseptatum* (basionym *Arthonia biseptata*). 116-117.

effectively published online 22 July 2015:

Kocourková, J. & K. Knudsen.
Notes on the California Lichen Flora 7: More New Records. 118-120.

effectively published online 2 October 2015:

Podaril, A.L. & J.T. Colbert.
Lichen Diversity in Southeast Iowa.
121-138.

effectively published online 20 November 2015:

Knudsen, K., J. Kocourková & T. Wheeler.
Protoparmelia ryaniana is a synonym of *Lecanora verrucariicola*, which belongs in the genus *Miriquidica* (Lecanoraceae)
139-143.

effectively published online 23 December 2015:

Knudsen, K. & J. Kocourková.
A new species of *Acarospora* (Acarosporaceae) from eastern Canada with melanized epihymenial accretions, with additional notes on *A. anatolica* and *Polysporina* terricola
144-147.

Opuscula Philolichenum, **14**: 1-57. 2015.
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Thelotremoid Graphidaceae from the NYBG herbarium: New species, range extensions, and a forgotten lichen

ROBERT LÜCKING[1]

ABSTRACT. – Study of a large collection of over 450 specimens of thelotremoid Graphidaceae housed at the New York Botanical Garden, almost exclusively from the Neotropics, revealed 23 species new to science which are formally described here: *Ampliotrema sanguineum* sp. nov., *Astrochapsa lobata* sp. nov., *Clandestinotrema hepaticola* sp. nov., *Glaucotrema bahianum* sp. nov., *Leucodecton minisporum* sp. nov., *L. uatumense* sp. nov., *Myriotrema arimense* sp. nov., *M. maroense* sp. nov., *Ocellularia baorucensis* sp. nov., *O. buckii* sp. nov., *O. caraibica* sp. nov., *O. comayaguana* sp. nov., *O. daniana* sp. nov., *O. dussii* sp. nov., *O. endoperidermica* sp. nov., *O. granpiedrensis* sp. nov., *O. imshaugii* sp. nov., *O. liamuiga* sp. nov., *O. macrospora* sp. nov., *O. maricaoensis* sp. nov., *O. pichinchensis* sp. nov., *Pycnotrema fissurinum* sp. nov., and *Rhabdodiscus trinitatis* sp. nov.. Updated identifications and collection data, including range extensions and selected annotations, are given for 119 additional taxa. Two new combinations are proposed: *Ocellularia rudior* (Vain.) comb. nov. (≡*Thelotrema rudius* Vain.), and *Phaeographis spondaica* (Nyl.) comb. nov. (≡*Thelotrema spondaicum* Nyl.; =*Graphis lecanographa* Nyl.). The "forgotten" species *Polystroma fernandezii* Clemente is discussed in detail.

KEYWORDS. – Brazil, Caribbean, Cuba, Dominican Republic, Ecuador, Federation of St. Kitts and Nevis, Guadeloupe, Honduras, Jamaica, Puerto Rico, Trinidad and Tobago, Venezuela.

INTRODUCTION

With many recent additions, Graphidaceae has surpassed Parmeliaceae as the largest family of lichenized fungi, now comprising approximately 2,500 species. It has even been predicted that the family may contain over 4,000 species, with many undescribed taxa awaiting discovery especially in tropical rain forests of the eastern Amazon, western Africa, continental southeast Asia, and Indonesia (Lücking et al. 2014). Among the best studied areas especially for the thelotremoid taxa in Graphidaceae are Costa Rica and Panama in the Neotropics (Hale 1978; Sipman et al. 2012), parts of tropical Africa (Frisch et al. 2006), and Australia (Mangold et al. 2009), but other regions remain considerably understudied (Lücking et al. 2014).

One of the genera likely to contain a large number of unrecognized species is *Ocellularia*, which even in the restricted sense of Frisch et al. (2006) and Rivas Plata et al. (2012a) remains a megadiverse taxon, representing the second largest genus in the family after *Graphis*, with several hundred species (Lücking et al. 2014). Since *Ocellularia* is most diverse in well-conserved rain forest and such places have not been well sampled globally, the predicted high species richness of *Ocellularia* appears to be reasonable and indeed most recently described species in Graphidaceae belong to this genus (Cáceres et al. 2014; Lücking et al. 2014; Papong et al. 2014). Another factor in recognizing additional species in Graphidaceae is a refined species concept based on molecular sequence data, which especially in *Ocellularia* has led to the distinction of a larger number of taxa in what previously were believed to represent single, variable species (Rivas Plata et al. 2012a, 2013; Lücking 2014; Kraichak et al. 2014).

Besides additional field work necessary in various parts of the world to sample unrecognized species of Graphidaceae, it is also indispensable to revise existing herbarium material which often contains historical and recent collections from places that might not exist anymore in their natural condition. The

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New York Botanical Garden herbarium (NY) holds one of the best collections of Graphidaceae in North America, arguably the second best collection after the United States National Herbarium at the Smithsonian (US). The collection at NY contains both historical specimens and more recent material, largely gathered by resident scientists Richard Harris and William Buck, with strong emphasis on the Caribbean (Cuba, Jamaica, Dominican Republic, Puerto Rico) and South America (Venezuela, Ecuador, Brazil). Most of these areas do not have good representations of Graphidaceae in any other herbarium collections, with the exception of Henry Imghaug's collections from the Caribbean at the Michigan State University Herbarium (MSC) and Hale's collections from Dominica (US).

This paper summarizes revisionary work undertaken on more than 450 collections of thelotremoid Graphidaceae from the New York Botanical Garden herbarium. As a result of these studies, 23 species are described as new, most of them (13) in the genus *Ocellularia*. In addition, range extensions are given for a number of taxa and some little known species are discussed and illustrated, in particular the enigmatic, forgotten taxon *Polystroma ferdinandezii* originally described from northern South America.

MATERIALS AND METHODS

All specimens are deposited in the herbarium of the New York Botanical Garden (NY). The material was studied at the Field Museum using standard techniques of light microscopy. Most specimens had prior identifications and almost all material had detailed data on secondary chemistry (performed by R. Harris), which greatly facilitated the revision. Thin-layer chromatography was only repeated in a few cases to verify prior results, in particular for newly described taxa. Species were identified using recent published keys (Rivas Plata et al. 2010; Gaswick & Lücking 2012) as well as yet unpublished keys, and were also compared with data and images of authentic type material accumulated for about 95% of the currently accepted species in the family. A key to selected species of *Ocellularia* comprising the *O. papillata* (Leight.) Zahlbr., *O. perforata* (Leight.) Müll. Arg., and *O. terebrata* (Ach.) Müll. Arg. complexes, which contain most of the recently described or reinstated species in the genus in this and other papers, has been published separately (Lücking 2014).

TAXONOMIC TREATMENT

I – NEW SPECIES

***Ampliotrema sanguineum* Lücking sp. nov.**

Mycobank #811176.

FIGURE 1A–D.

TYPE: VENEZUELA. AMAZONAS: Atabapo, Cerro Marahuaca, Cumbre, 03°35′N, 65°20′W, 2480–2580 m, swampy plateau (altiplano) with exposed rocks, 31.i.1982-10.ii..1982, *M. Guariglia et al. 1626* (NY!, holotype).

DIAGNOSIS. – Differing from *Ampliotrema auratum* in the bullate thallus, the additional red pigment (isohypocrellin) in the thallus and on the ascomata, and the ascospores becoming brown.

DESCRIPTION. – Thallus on dead wood and plant debris, up to 7 cm diam., continuous; surface bullate, yellowish to greyish white; prothallus absent. Thallus in section 300–500 µm thick, with dense, paraplectenchymatous cortex, 10–20 µm thick, irregular photobiont layer 50–70 µm thick, with dispersed large clusters of calcium oxalate crystals, and medulla, 200–400 µm thick, strongly encrusted with clusters of calcium oxalate crystals, numerous small, gray crystals, and in portions with red crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, grey-green, 8–12 × 6–8 µm. Ascomata rounded, sessile, with nearly complete thalline margin, 2–4 mm diam., 0.7–1.2 mm high; disc partially exposed, with 1–2.5 mm wide pore, with thick, orange-yellow pruina; proper margin indistinct, slightly fissured, visible as thin, black rim around the pore; thalline margin entire to slightly fissured above, rough, olive-gray with more or less distinct, red pruina. Excipulum entire, laterally carbonized, 100–200 µm wide, fused with thalline margin; laterally covered by algiferous, corticate thallus layer with thick medulla containing clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 10–20 µm high, orange; hymenium 100–120 µm high, yellow, strongly inspersed;

epithecium 10–15 µm high, yellow-gray granular. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 100–110 × 10–12 µm. Ascospores 8 per ascus, more or less uniseriate, broadly ellipsoid to oval, muriform with 3–5 transverse and 1–2 longitudinal septa per segment, 15–20 × 10–12 µm, 1.2–1.8 times as long as wide, for a long time hyaline but becoming light golden brown eventually, distoseptate with rounded lumina, I+ violet-blue.

CHEMISTRY. – Protocetraric and virensic acids, in addition with isohypocrellin in the medulla and covering the ascoma margin, and with orange-yellow anthraquinone covering the disc; medulla where white P+ orange-red, microscopic section K–; red portions of medulla and ascoma margin K+ green, orange-yellow disc pigment K+ yellow.

ETYMOLOGY. – The epithet refers to the blood-red to dark red color of the isohypocrellin pigment.

DISTRIBUTION AND ECOLOGY. – Thus far known from exposed habitat at high elevation in the Amazonian Andes of Venezuela.

DISCUSSION. – *Ampliotrema sanguineum* is a remarkable new species both regarding its ecology and its pigment chemistry. It is the first species of *Ampliotrema* occurring in a high altitude Andean ecosystem, whereas other species of the genus are found in tropical rain forest. Indeed, the thick, bullate thallus is more reminiscent of high altitude crustose lichens. It is also the first species in the genus that produces an additional pigment besides the pigment usually covering the disc; in the present case, the quinone isohypocrellin is found in the medulla and covering the outer ascoma margin. The ascospores becoming brown is also unusual and thus far only known from *A. panamense* (Hale) Sipman & Lücking. Otherwise, the species is most similar to *A. auratum* (Tuck.) Kalb ex Kalb, which agrees in gross morphology and ascospore size and septation, but lacks thallus pigments and the disc is bright yellow.

***Astrochapsa lobata* Lücking sp. nov.**

Mycobank #811177.

FIGURE 1E–F.

TYPE: FEDERATION OF ST. KITTS AND NEVIS. ST. PAUL CAPESTERRE PARISH AND ST. THOMAS MIDDLE ISLAND PARISH: St. Kitts, Mount Liamuiga Crater, trail from Belmont Estate to rim of crater, 17°22'N, 62°48'W, 350–900 m (550 m), moist forest (below) to elfin cloud forest (above); 5.ii.1996, *R.C. Harris 37908* (NY!, holotype).

DIAGNOSIS. – Differing from *Astrochapsa astroidea* in the ascomata becoming lobate and with evanescent margins, with the centers dying off.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface uneven, olive-green; prothallus absent. Thallus in section 30–50 µm thick, with dense, prosoplectenchymatous cortex, 10–15 µm thick, and photobiont layer 20–35 µm thick, with scattered clusters of calcium oxalate crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 7–9 µm. Ascomata at first angular rounded but soon becoming lobate with the central portion dying off, immersed-erumpent, chroodiscoid, with lateral thalline margin, 1–3 mm diam., 0.12–0.15 mm high; disc exposed, flesh-colored to pinkish, very thinly white-pruinose; proper margin distinct, fissured to lobulate, visible as thin, whitish rim around the disc; thallus margin fissured to lobulate but lobules breaking off early during development, remaining as more or less erect rim fused with the proper margin, olive-brown to olive-green. Excipulum entire, paraplectenchymatous, hyaline, 15–25 µm wide, fused with thalline margin; laterally covered by thin, brown periderm and algiferous, corticate thallus; columella absent; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline; hymenium 70–80 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline. Paraphyses unbranched, apically smooth, slightly capitate; periphysoids present, distinct, 10–20 µm long; asci clavate, 70–80 × 8–10 µm. Ascospores 8 per ascus, irregularly arranged, oblong with distinctly tapering, acute distal end, 5–7-septate, 15–20 × 3.5–4.5 µm, 4–5 times as long as wide, hyaline, subdistoseptate to nearly euseptate with rectangular lumina, I–.

CHEMISTRY. – No substances detected by TLC.

ETYMOLOGY. – The epithet refers to the ascomata becoming lobate.

DISTRIBUTION AND ECOLOGY. – Thus far known from mid-elevation moist forest in Jamaica.

DISCUSSION. – This new species is close to the type species of *Astrochapsa*, *A. astroidea* (Berk. & Broome) Parnmen, Lücking & Lumbsch, as well as *A. fusca* Lücking and *A. platycarpella* (Vain.) Parnmen, Lücking & Lumbsch (Parnmen et al. 2012). All three differ in the more or less rounded, distinctly chroodiscoid ascomata with persistent, recurved, triangular lobules, not becoming lobate with an evanescent margin and with the center dying off. *Astrochapsa platycarpella* also differs in the smaller, persistently 3-septate ascospores and the distinct bluish tinge of the ascoma disc.

***Clandestinotrema hepaticola* Lücking sp. nov.**

Mycobank #811178.

FIGURE 2A–C.

TYPE: VENEZUELA. AMAZONAS: Río Negro, NW plateau of Cerro de la Neblina, summit camp #3, 00°54′N, 66°04′W, 1830 m, *Neblinaria* savanna, on hepatics, 17.ii.1984, *W.R. Buck 10930* (NY!, holotype).

DIAGNOSIS. – Differing from *Clandestinotrema tenuis* in the carbonized excipulum, lack of columella, and hepaticolous growth.

DESCRIPTION. – Thallus hepaticolous on dead *Metzgeria* and other hepatics, partially within the upper dead cell layers of the substrate, up to ca. 10 cm diam., continuous and spreading over numerous branches; surface smooth, yellowish white; prothallus absent. Thallus in section 30–50 µm thick, with dense, prosoplectenchymatous cortex, 5–10 µm thick, irregular photobiont layer 25–40 µm thick, and indistinct medulla. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, grey-green, 8–10 × 6–8 µm. Ascomata rounded, immersed to erumpent, with nearly complete thalline margin, 0.2–0.3 mm diam., 0.15–0.2 mm high; disc covered by 0.1–0.15 mm wide pore; proper margin distinct, entire, visible as thick, black rim around the pore; thalline margin entire, smooth, white. Excipulum entire, laterally carbonized to the base, 50–80 µm wide, fused with thalline margin; laterally covered by thin, algiferous, corticate thallus layer; columella absent; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline to pale yellowish; hymenium 50–60 µm high, hyaline, clear; epithecium indistinct, 3–5 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci clavate, 45–55 × 10–12 µm. Ascospores 8 per ascus, more or less uniseriate, ellipsoid, submuriform with 3 transverse and 0–1 longitudinal septa per segment, 10–14 × 4–5 µm, 2.5–3 times as long as wide, hyaline, distoseptate with diamond-shaped lumina (astrothelioid), I–.

CHEMISTRY. – No substances detected by TLC.

ETYMOLOGY. – The epithet refers to the unusual substrate for a species of this genus.

DISTRIBUTION AND ECOLOGY. – Thus far known from a montane savanna in eastern Venezuela.

DISCUSSION. – This new species was first identified as *Ocellularia tenuis* (Hale) Hale, a species now included in the genus *Clandestinotrema* (Rivas Plata et al. 2012b). However, the latter has columellate ascomata with narrower pores and dark brown (not carbonized) excipula and columellas. The only other species with a densely corticate thallus, carbonized excipulum but lacking a columella, and with submuriform ascospores is *C. antoninii* (Purvis & P. James) Rivas Plata, Lücking & Lumbsch, which has larger ascomata completely covered by thallus and larger ascospores. The ecology of the new species, growing on dead hepatics, is also unique within the genus. It superficially resembles the genus *Melanotopelia*, which differs in its ascomata with fissured margins and periphysoids and much larger, richly muriform ascospores.

Glaucotrema bahianum Lücking sp. nov.

Mycobank #811179.

FIGURE 2D–F.

TYPE: BRAZIL. BAHIA: Municipio Uruçuca, 6.2 km N of town of Serra Grande, 40 km N of Ilheus along coast, 14°26′S, 39°03′W, 200 m, tropical forest with small stream in ravine, 17.vii.1991, *D. Vital & W.R. Buck 20303* (NY!, holotype).

DIAGNOSIS. – Differing from *Glaucotrema stegoboloides* in the ascomata with thin, radiating, dark brown columella strands.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface uneven to areolate, fragile, light greenish grey, glossy; prothallus absent. Thallus in section 100–200 µm thick, with dense, prosoplectenchymatous cortex with internal splitting, 3–5 µm thick, photobiont layer 20–30 µm thick, and thick medulla, 70–150 µm thick, encrusted with large clusters of calcium oxalate crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–12 × 7–10 µm. Ascomata rounded to slightly irregular in outline, becoming sessile, with nearly complete thalline margin, 1.5–2.5 mm diam., 0.7–1 mm high; disc more or less exposed, thickly white-pruinose, divided by thin, irregular to radiating strands of columella; proper margin distinct, entire, visible as thick, white to cream-colored rim around the disc; thalline margin entire, uneven, pale greenish grey, glossy. Excipulum entire, orange-brown, 50–80 µm wide, fused with thalline margin; laterally covered by amorphous, orange periderm layer and algiferous, corticate thallus with large clusters of calcium oxalate crystals; columella present, forming numerous thin, irregular to radiating strands, strands up to 50 µm broad, dark brown and covered with crystal clusters; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline; hymenium 80–90 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, grey-granular. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 70–80 × 8–10 µm. Ascospores 8 per ascus, more or less uniseriate, oblong, 3-septate, 12–15 × 6–7 µm, 1.8–2.2 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet refers to the area where the type was collected.

DISTRIBUTION AND ECOLOGY. – Thus far known from Atlantic rain forest in southeastern Brazil.

DISCUSSION. – This new species at first glance resembles the genera *Rhabdodiscus* and *Stegobolus* in the large ascomata with irregular columella and the psoromic acid chemistry. However, from *Rhabdodiscus* it differs in the uncarbonized excipulum and the morphology of the columella, forming very thin strands. Both these characters are found in *Stegobolus*, but species in that genus have a different ascoma morphology, with a more or less felty inner surface. Also, the thallus structure of the new species differs from both *Rhabdodiscus* and *Stegobolus* in the thin, fragile cortex and the thick, massively crystalline medulla. Such a structure is more reminiscent of the genus *Glaucotrema* (Rivas Plata et al. 2012a), in which a *Stegobolus*-like species was recently described, *G. stegoboloides* M. Cáceres, Aptroot & Lücking (Cáceres et al. 2014), and another, undescribed one is known from Thailand, both confirmed by sequence data (Kraichak et al. 2014). Hence the new species is placed in *Glaucotrema.* It differs from *G. stegoboloides* in the structure of the columella (thick and mostly covering the disc in the latter) and the lack of papillae on the thallus. Most similar in the genus *Stegobolus* is *S. radians* (Müll. Arg.) Frisch, which has a similar columella structure, but has different thallus and ascoma margin morphologies, a lighter columella and ascospores that are about twice as long and 3–7-septate.

Leucodecton minisporum Lücking sp. nov.

Mycobank #811180.

FIGURE 3A–D.

TYPE: DOMINICAN REPUBLIC. ALTAGRACIA: 5.5 km S of La Romana-Higüey Hwy on road to Bayahibe, 18°24′N, 68°50′W, sea level, dry forest over karst limestone,22.i.1991, *R.C. Harris 26550* (NY!, holotype).

DIAGNOSIS. – Differing from *Leucodecton glaucescens* in the dispersed, smaller ascomata not forming pseudostromata and with fused excipulum, and the very small ascospores.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 5 cm diam., continuous; surface uneven, coarsely folded as if gall-forming but hollow below, minutely grainy, yellowish gray to light brownish yellow; prothallus absent. Thallus in section 100–150 µm thick, with paraplectenchymatous cortex, 15–25 µm thick, and massive, irregular photobiont layer, up to 130 µm thick, encrusted with massive, columnar clusters of calcium oxalate crystals and dense, small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 7–11 × 6–9 µm. Ascomata rounded to elongate, aggregated in groups of 50–100 but not fused and not forming pseudostromata, immersed, with nearly complete thalline margin, 0.1–0.2 mm diam., 0.07–0.1 mm high; disc partially covered by 0.05–0.1 mm wide pore, light brown, thinly white-pruinose; proper margin distinct, visible as thin, light brown rim around the pore; thalline margin entire, minutely grainy, light yellowish to light brownish yellow. Excipulum entire, paraplectenchymatous, hyaline to pale yellowish, 20–30 µm wide, fused with thalline margin; laterally covered by algiferous, corticate thallus layer with large, columnar clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline to pale yellowish; hymenium 50–60 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci clavate to fusiform, 45–55 × 10–12 µm. Ascospores 8 per ascus, irregularly arranged, ellipsoid to oval, submuriform with 3 transverse and 0–1 longitudinal septa per segment, 10–12 × 5–7 µm, 1.7–2.2 times as long as wide, brown, distoseptate with lens-shaped to rounded lumina, I+ violet-blue when young.

CHEMISTRY. – Stictic, constictic, hypoconstictic, acetylconstictic, and hypostictic acids; medulla P+ orange-red, microscopic section with K+ persistently yellow efflux.

ETYMOLOGY. – The epithet refers to the unusually small ascospores for a species of this genus.

DISTRIBUTION AND ECOLOGY. – Thus far known from dry karst forest on the island of Hispaniola.

DISCUSSION. – *Leucodecton minisporum* is at first glance a rather unspectacular new species. It differs from similar and related taxa in the aggregated ascomata that have a fused excipulum and comparatively wide pore with partially a exposed disc, in combination with the “gall-forming” thallus which is not really gall-forming but the term is here used to denote thalli that appear inflated and are hollow underneath. A spectacular feature are the very small ascospores, much smaller than in other species of the genus; the species with the next larger ascospores, *L. phaeosporum* (Nyl.) Rivas Plata & Lücking, has ascospores 15–25 × 7–15 µm. *Leucodecton glaucescens* (Nyl.) Frisch agrees in thallus morphology with the new species and the ascomata are also aggregated, but they are minutely chroodiscoid and form distinct pseudostromata, and the ascospores are larger. *Leucodecton subcompunctum* (Nyl.) Frisch also has ascomata with comparatively wide pores that partially expose the disc, but the ascomata are dispersed, although dense, and feature a free excipulum (double margin), and the ascospores are larger (Rivas Plata et al. 2010). *Leucodecton sordidescens* (Fée) Lücking & Sipman (Sipman et al. 2012) features dispersed ascomata with a very narrow pore completely concealing the disc, resembling a species of *Porina* rather than a member of Graphidaceae; it also has larger ascospores.

Additional specimen examined. – **DOMINICAN REPUBLIC. ALTAGRACIA:** 4 km N of Bayahibe, 18°25′N, 68°50′W, sea level, dry forest with cacti, 30.iii.1981, *W.R. Buck 5144* (NY).

Leucodecton uatumense Lücking sp. nov.

Mycobank #811181.

FIGURE 3E–F.

TYPE: BRAZIL. AMAZONAS: Along Igarapé Caititu, off Rio Uatumã, at Antônio Filinto (old rosewood factory); 01°45'N, 59°40'W; campina; 18–19.viii.1979, *W.R. Buck 2965* (NY!, holotype).

DIAGNOSIS. – Differing from *Myriotrema norsticticum* in the lepadinoid ascomata with double margins and the smaller, distoseptate ascospores.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 10 cm diam., continuous; surface uneven to verrucose, light yellowish to brownish grey; prothallus absent. Thallus in section 100–130 µm thick, with dense, prosoplectenchymatous cortex, 10–20 µm thick, photobiont layer 30–50 µm thick, and medulla 50–70 µm thick, both photobiont later and medulla (especially in the verrucae) encrusted with clusters of calcium oxalate crystals and dense, small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 7–12 × 6–9 µm. Ascomata rounded, erumpent, with nearly complete thalline margin, 0.15–0.25 mm diam., 0.1–0.15 mm high; disc partially covered by 0.1–0.2 mm wide pore, flesh-colored; proper margin distinct, separated from the thalline margin by a slit, visible as thick, creme-colored inner rim covering most of the disc, fissured; thalline margin entire to slightly fissured, thin, erect, yellowish grey. Excipulum entire, prosoplectenchymatous, orange-brown to dark brown, 20–30 µm wide, separate from thalline margin; laterally covered by algiferous, corticate thallus layer with clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline to pale yellowish; hymenium 50–60 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci clavate to fusiform, 50–60 × 15–20 µm. Ascospores 8 per ascus, irregularly arranged, ellipsoid, submuriform with 3 transverse and 0–1 longitudinal septa per segment, 10–12 × 6–8 µm, 1.5–1.8 times as long as wide, hyaline, subdistoseptate with lens-shaped to rectangular lumina, I+ violet-blue.

CHEMISTRY. – Norstictic acid; medulla P+ orange-red, microscopic section with K+ yellow efflux forming red, needle-shaped crystals.

ETYMOLOGY. – The epithet refers to the type locality near the Rio Uatumã.

DISTRIBUTION AND ECOLOGY. – Thus far known from campina vegetation in Amazonian Brazil.

DISCUSSION. – This new species is here placed in the genus *Leucodecton*, due to its similarity with *L. expallescens* (Nyl.) Rivas Plata & Lücking and *L. inspersum* Rivas Plata & Lücking (Rivas Plata et al. 2010; Rivas Plata & Lücking 2013). Both differ in having the stictic acid chemistry and *L. inspersum* also has much larger ascospores and an inspersed hymenium, whereas *L. expallescens* has a more or less smooth thallus with a loose cortex and slightly larger ascospores. The new taxon was originally identified as *Myriotrema norsticticum* (Hale) Hale, but that species has myriotremoid ascomata with fused excipula and larger, distoseptate ascospores.

Additional specimen examined. – **BRAZIL. AMAZONAS:** same data as for the type, 18–19.viii.1979, *W.R. Buck 2957* (NY).

Myriotrema arimense Lücking sp. nov.

Mycobank #811182.

FIGURE 4A–D.

TYPE: TRINIDAD AND TOBAGO. TRINIDAD: Arima Valley, 5.i.1959, *H. Fleming s.n.* (NY!, holotype).

DIAGNOSIS. – Differing from *Myriotrema microporum* in the larger ascomata with fused excipulum and distinct white rim.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface uneven to coarsely areolate-bullate, mottled silvery-gray to yellowish white; prothallus absent. Thallus in section 150–250 µm thick, with dense, prosoplectenchymatous cortex, 15–25 µm thick, and massive photobiont layer, 130–230 µm thick, in irregular, vertical groups, basally encrusted with large clusters of calcium oxalate crystals and also with numerous small, gray crystals; proper medulla indistinct. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in vertical clusters, dark olive-green, 8–11 × 6–9 µm. Ascomata rounded, immersed, with nearly complete thalline margin, 0.2–0.3(–0.4) mm diam., 0.15–0.2 mm high; disc covered by 0.1–0.2(–0.25) mm wide pore and rarely with irregular, white pseudocolumella; proper margin distinct, entire, visible as thick, pure white rim around the pore; thalline margin entire, silvery-grey. Excipulum entire, yellowish brown, 30–50 µm wide, fused with thalline margin; laterally covered by algiferous, corticate thallus; columella usually absent, rarely a hyaline, irregular pseudocolumella covering the hymenium and connecting to the excipulum; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline; hymenium 70–80 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 70–80 × 10–12 µm. Ascospores 8 per ascus, more or less uniseriate to irregularly arranged, ellipsoid, submuriform with 3–5 transverse and 0–1 longitudinal septa per segment, 15–20 × 10–13 µm, 1.3–1.7 times as long as wide, hyaline, distoseptate with lens-shaped to rounded lumina and rather thick outer wall, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet refers to the type locality in the Arima Valley.

DISTRIBUTION AND ECOLOGY. – Thus far known from moist forest in the Arima Valley on Jamaica.

DISCUSSION. – *Myriotrema arimenses* is a morphologically quite appealing species, due to the unusually large, myriotremoid ascomata with distinct, white rims. It is reminiscent of the recently described *M. classicum* Lücking, which differs, however, in having a narrower pore bordered by a very broad white rim and narrower ascospores with thinner walls, as well as a smooth thallus (Sipman et al. 2012). *Myriotrema clandestinum* (Fée) Hale differs in the transversely septate ascospores, narrow pore without a distinct white rim, and smooth thallus (Sipman et al. 2012). The thallus structure of the new species suggests a close relationship with *Myriotrema* s. str., i.e. *M. olivaceum* Fée and *M. microporum* (Mont.) Hale (Mangold et al. 2009). The latter agrees in chemistry and the distinct white rim around the pore, but has transversely septate ascospores and ascomata with a free excipulum (double margin).

***Myriotrema maroense* Lücking sp. nov.**

Mycobank #811183.

FIGURE 4E–F.

TYPE: VENEZUELA. AMAZONAS: Río Guainía, just E of Maroa; forest; 5.vii.1959, *J.J. Wurdack & L.S. Adderley 43331* (NY!, holotype).

DIAGNOSIS. – Differing from *Myriotrema hartii* in the presence of hypoprotocetraric acid as the major secondary compound.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 20 cm diam., continuous; surface uneven, olive-green, densely isidiate. Isidia cylindrical, up to 5 mm long and 0.1–0.15 mm broad, erect to decumbent, mostly unbranched but sometimes irregularly fusing, with shallow constrictions indicating seasonal or annual growth, olive-green with pale tip. Thallus in section 150–200 µm thick, with dense, prosoplectenchymatous cortex with internal splitting, 15–25 µm thick, thick photobiont layer, 50–80 µm thick, and thick medulla, 80–100 µm thick, densely encrusted with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–12 × 6–10 µm. Ascomata not observed.

CHEMISTRY. – Hypoprotocetraric and 4-*O*-demethylnotatic acids; medulla P–, microscopic section K–.

ETYMOLOGY. – The epithet refers to the type locality near Maroa.

DISTRIBUTION AND ECOLOGY. – Thus far known from Amazon rain forest in eastern Venezuela.

DISCUSSION. – This new species is described here even in the absence of ascomata, since the thallus structure, isidia, and chemistry strongly suggest placement in *Myriotrema* s. str. Genuine, long-cylindrical isidia are rare in the family, being known only from the genera *Acanthotrema*, *Fibrillithecis*, and *Myriotrema* s. str. (Frisch et al. 2006; Rivas Plata et al. 2010). Species of *Acanthotrema* lack secondary substances and have a thin thallus, whereas species of *Fibrillithecis* almost without exception have a white thallus with psoromic acid chemistry, so placement in these genera is unlikely. *Myriotrema* s. str. commonly features psoromic or hypoprotocetraric acid as major compounds, and *M. hartii* (Müll. Arg.) Hale does produce long-cylindrical isidia. That species, however, differs from the new species in the psoromic acid chemistry.

***Ocellularia baorucensis* Lücking sp. nov.**

Mycobank #811184.

FIGURE 5A–B.

TYPE: DOMINICAN REPUBLIC. INDEPENDENCIA: Sierra de Baoruco, 23.5 km S of Puerto Escondito, then 9 km E along road to Charco Colorado, 18°16′N, 71°31′W, 1800 m, humid hardwood forest with tree ferns; 25.i.1987, *R.C. Harris 20541* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia protocetrarica* in the smaller ascomata with a narrow pore and a finger-like, carbonized columella present in some of the ascomata.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 10 cm diam., continuous; surface smooth to uneven, yellowish gray to light brownish yellow; prothallus absent. Thallus in section 80–120 µm thick, with dense, prosoplectenchymatous cortex, 15–25 µm thick, irregular photobiont layer 25–50 µm thick, and medulla, 40–70 µm thick, strongly encrusted with clusters of calcium oxalate crystals and also with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–10 × 6–8 µm. Ascomata rounded, erumpent to prominent, with complete thalline margin, 0.6–1 mm diam., 0.3–4 mm high; disc covered by 0.1–0.15 mm wide pore, in part of the ascomata filled by black-tipped columella; proper margin distinct, visible as thin, white rim around the pore; thalline margin entire, smooth, light yellowish to light brownish yellow. Excipulum entire, orange-brown, 40–60 µm wide, fused with thalline margin; laterally covered by algiferous, corticate thallus layer with thick medulla containing clusters of calcium oxalate crystals and numerous small, gray crystals; columella present in part of the ascomata, finger-like, sometimes plug-shaped on the hymenium, up to 70 µm broad and up to 100 µm high, carbonized; hypothecium prosoplectenchymatous, 10–15 µm high, yellowish; hymenium 100–120 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline to greyish. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 100–110 × 11–13 µm. Ascospores 8 per ascus, more or less uniseriate, ellipsoid, 5-septate, 17–25 × 8–10 µm, 1.8–2.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Protocetraric and virensic acids; medulla P+ orange-red, microscopic section K–.

ETYMOLOGY. – The epithet refers to the type locality in the Sierra de Baoruco.

DISTRIBUTION AND ECOLOGY. – Thus far known from moist forest on the island of Hispaniola.

DISCUSSION. – This new species was first identified as *Ocellularia protocetrarica* Hale, which was considered a synonym of *O. mauretiana* Hale by Frisch et al. (2006). Both the neotropical *O. protocetrarica* and the paleotropical *O. mauretiana* have ascomata with a broad pore forming a complex, non-carbonized columella; they differ from each other chiefly in the morphology of the ascoma margin. *Ocellularia baorucensis* is distinguished from both species by the much smaller ascomata with a very narrow pore in which some of the ascomata feature a narrow, finger-like, carbonized columella. The combination of non-carbonized excipulum and carbonized columella is known from a few species in the genus, some also producing protocetraric acid. Among these, *O. violacea* differs from the new species in its smaller, flatter ascomata with regularly present columella, whereas *O. flavoperforata* Lücking also has smaller, flatter ascomata and a pale yellow medulla (Sipman et al. 2012).

Ocellularia buckii **Lücking sp. nov.**

Mycobank #811185.

FIGURE 5C–D.

TYPE: BRAZIL. AMAZONAS: Ilha Acarabu, in Rio Negro at mouth of Rio Marie, 00°25'S, 66°25'W, flood plain forest, 4.vii.1979, *W.R. Buck 2340A* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia papillata* in the verrucose to ridged thallus and the apically carbonized excipulum and columella.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 10 cm diam., continuous; surface densely verrucose-rugose, green-gray to yellowish grey; prothallus absent. Thallus in section 120–150 µm thick, with dense, paraplectenchymatous cortex, 20–30 µm thick, photobiont layer 30–50 µm thick, and thick medulla, 70–80 µm thick, formed by large clusters of calcium oxalate crystals corresponding to the verrucae. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–12 × 7–10 µm. Ascomata rounded to slightly irregular in outline, immersed-erumpent, with complete thalline margin, 0.3–0.4 mm diam., 0.1–0.12 mm high; disc covered by 0.05–0.1 mm wide pore, filled by black-tipped columella; proper margin distinct, visible as thin, brown-black rim around the pore; thalline margin entire, smooth to verrucose, light yellowish grey. Excipulum entire, in lower part orange-brown, apically carbonized, 20–40 µm wide, fused with thalline margin; laterally covered by amorphous, orange-brown periderm layer, 30–50 µm wide, and algiferous, corticate thallus layer with thick medulla containing large clusters of calcium oxalate crystals; columella present, finger-like to plug-shaped, up to 70 µm broad and up to 80 µm high, apically carbonized; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline; hymenium 80–100 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 80–90 × 10–12 µm. Ascospores 8 per ascus, more or less uniseriate, ellipsoid, 5-septate, 20–25 × 7–8 µm, 2.5–3.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – No substances detected by TLC.

ETYMOLOGY. – The epithet honors the collector of the type material, William R. Buck (b. 1950), one of the keenest collectors of unusual lichens.

DISTRIBUTION AND ECOLOGY. – Thus far known from tree trunks in the understory of Amazon rain forest.

DISCUSSION. – *Ocellularia buckii* would typically be identified with the commonly used name *O. papillata* (Leight.) Zahlbr., due to the columellate ascomata, small, transversely septate ascospores, and lack of secondary substances. However, this group of species comprises considerable morphological variation that hitherto has not been properly regarded (Lücking 2014), and molecular phylogenetic analyses suggest that this general morphodeme evolved independently in different lineages (Rivas Plata et al. 2012a). The new species differs from *O. papillata* s. str. in several characters, viz. the verrucose-rugose thallus (vs. smooth in *O. papillata*) and the apically carbonized excipulum and columella (vs. dark brown in *O. papillata*). *Ocellularia viridipallens* Müll. Arg. agrees in the apically carbonized excipulum and columella, but has an uneven to shallowly verrucose thallus with scattered crystal clusters and a white rim around the pore of the ascomata (Lücking 2014).

Ocellularia caraibica Lücking sp. nov.

Mycobank #811186.

FIGURE 5E.

TYPE: PUERTO RICO. HUMACAO: Caribbean National Forest, Luquillo Division, El Toro Mountain, trail from El Verde side on Hwy 186, 1000–1074 m, mossy cloud forest at summit, 4.vi.1988, *R.C. Harris 22226* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia carassensis* in the transversely septate ascospores.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface uneven to verrucose, olive-green to olive-yellow; prothallus absent. Thallus in section 100–120 µm thick, with dense, prosoplectenchymatous cortex, 10–20 µm thick, photobiont layer 30–50 µm thick, and medulla, 50–70 µm thick; photobiont layer and medulla with scattered clusters of calcium oxalate crystals and numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 6–9 µm. Ascomata rounded, erumpent to prominent, with complete thalline margin, 0.7–1 mm diam., 0.3–0.4 mm high; disc covered by 0.1–0.2 mm wide pore; proper margin distinct, entire, visible as thin, brown rim around the pore with inner yellowish-white zone; thalline margin entire, smooth or with slight radial ridges, light yellowish grey. Excipulum entire, brownish yellow below, apically carbonized, 50–80 µm wide, fused with thalline margin; laterally covered by orange-brown, amorphous periderm and algiferous, corticate thallus containing scattered clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline to pale yellowish; hymenium 200–220 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched except a very narrow zone bordering the excipulum, there branched and anastomosing, apically smooth; periphysoids absent; asci fusiform to clavate, 180–200 × 20–30 µm. Ascospores 2–6(–8) per ascus, obliquely uniseriate to irregularly arranged, ellipsoid to oblong, 11–15-septate, 50–70 × 12–14 µm, 4.5–5.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet refers to the presumed Caribbean distribution of this species.

DISTRIBUTION AND ECOLOGY. – Known from higher altitude forest in various areas of the Caribbean National Forest in Puerto Rico.

DISCUSSION. – This new species belongs in a group centered around *Ocellularia carassensis* (Hale) Sipman, all with similar gross morphology, lack of columella, small to medium-sized ascospores, and psoromic acid chemistry (Sipman et al. 2012). Three species in this group, viz. *O. carassensis*, *O. subcarassensis* Sipman & Lücking, and *O. dussii* Lücking (see below), have muriform ascospores, and *O. caraibica* is the first species in this group with transversely septate ascospores. There is no other similar species in the genus; other species with psoromic acid and comparable morphology have small ascospores usually not exceeding 30 µm in length, and other species with large, transversely septate ascospores have distinct chemical profiles including mostly hypoprotocetraric acid or the cinchonarum unknown.

Additional specimen examined. – **PUERTO RICO. PONCE:** Cordillera Central, Caribbean National Forest, Toro Negro Division, along Hwy 143 at km 20, 1000–1200 m, lower montane wet broad-leaf-palm-tree fern forest on windward slope, 2.vi.1988, *R.C. Harris 22051* (NY), *R.C. Harris 22079* (NY).

Ocellularia comayaguana Lücking sp. nov.

Mycobank #811187.

FIGURE 5F.

TYPE: HONDURAS. COMAYAGUA: From Agua Amarilla to San José de los Planes, 11–15 km E of Kale Yojoa, 14°47′N, 87°51′W, 1740 m, on trunk along trail; 14.iii.1993, *B.H. Allen 14013* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia thelotremoides* in the ascomata with broader pores, lack of a columella, and uncarbonized excipulum.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 10 cm diam., continuous; surface verrucose or with short ridges, light olive-grey; prothallus absent. Thallus in section 50–100 µm thick, with dense, paraplectenchymatous cortex, 10–15 µm thick, photobiont layer, 20–30 µm thick, and medulla (particularly developed in the verrucae and ridges), 20–70 µm thick, strongly encrusted with clusters of calcium oxalate crystals and both photobiont layer and medulla also encrusted with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–12 × 6–9 µm. Ascomata rounded, erumpent, with complete thalline margin, 0.4–0.6 mm diam., 0.15–0.2 mm high; disc covered by 0.1–0.2 mm wide pore; proper margin indistinct, visible as thin, pale yellowish rim around the pore; thalline margin entire, smooth, light yellowish green. Excipulum entire, orange-brown but becoming dark brown apically, 30–50 µm wide, fused with thalline margin; laterally covered by thin, amorphous periderm layer and algiferous, corticate thallus layer with clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 10–15 µm high, yellowish; hymenium 120–130 µm high, hyaline, clear; epithecium indistinct, 5–7 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci oblong, 110–120 × 20–25 µm. Ascospores 8 per ascus, irregularly arranged, ellipsoid, submuriform with 7–9 transverse and 0–1 longitudinal septa per segment, 25–32 × 10–12 µm, 2.5–3 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Protocetraric and virensic acids; medulla P+ orange-red, microscopic section K–.

ETYMOLOGY. – The epithet refers to the province in Honduras where the species was collected.

DISTRIBUTION AND ECOLOGY. – Thus far known from tree trunks in montane rain forest in Honduras; probably more widespread in Central America.

DISCUSSION. – This new species is very similar to species in the *Ocellularia thelotremoides* (Leight.) Zahlbr. complex, in particular *O. subsimilis* (Hale) Hale. The two species differ, however, in the presence of a columella and in the distinct carbonization in the case of *O. thelotremoides*. Also, the apothecial pores are narrower. *Myriotrema viride* Nagarkar & Hale agrees with the new species in the absence of a columella and the uncarbonized excipulum, but has smaller, immersed ascomata with very narrow pores.

Ocellularia daniana Lücking sp. nov.

Mycobank #811188.

FIGURE 6A–C.

TYPE: CUBA. SANTIAGO DE CUBA: Arroyo Negro, 4 km SE of La Gran Piedra, 1000 m; moist, shady forest along stream and banks along trail, 5.iv.1982, *R.C. Harris 14443* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia perforata* in the verrucose thallus and the ascomata with a thick white rim and a carbonized columella.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 10 cm diam., continuous; surface uneven to coarsely verrucose or bumpy, green-grey; prothallus absent. Thallus in section 100–150 µm thick, with dense, prosoplectenchymatous cortex, 15–25 µm thick, irregular photobiont layer 30–50 µm thick, and medulla, 50–80 µm thick, strongly encrusted with clusters of calcium oxalate crystals and also with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 6–8 µm. Ascomata rounded, erumpent, with nearly complete thalline margin, 0.4–0.6 mm diam., 0.12–0.15 mm high; disc covered by 0.1–0.15 mm wide pore, filled by black-tipped or thinly pruinose columella; proper margin distinct, visible as white rim around the pore; thalline margin entire, smooth to bumpy, light green-grey. Excipulum entire, yellowish to orange, 20–30 µm wide, fused with thalline margin; laterally covered by amorphous, orange periderm layer, 30–50 µm wide, and algiferous, corticate thallus layer with thick medulla containing large clusters of calcium oxalate crystals and numerous small, gray crystals; columella present, finger-like, up to 50 µm broad and up to 120 µm high, carbonized; hypothecium prosoplectenchymatous, 10–15 µm high, yellowish; hymenium 100–120 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline to greyish. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 100–110 × 10–12 µm. Ascospores 8 per ascus, more or less uniseriate, ellipsoid to oblong, 5-septate, 20–25 × 7–8 µm, 2.5–3.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Protocetraric and virensic acids; medulla P+ orange-red, microscopic section K–.

ETYMOLOGY. – Named after Dania Rosabal, a promising young lichen researcher from Cuba.

DISTRIBUTION AND ECOLOGY. – Found in shady, moist gallery forest at mid elevation.

DISCUSSION. – This is another new species in the *Ocellularia perforata* complex (Lücking 2014) and was originally identified as that species. *Ocellularia perforata* itself differs in the dark brown excipulum and columella, the distinctly ridged thallus, and the lack of a white rim around the pore of the ascomata. *Ocellularia violacea* Räsänen agrees with the new species in the uncarbonized excipulum combined with carbonized columella, but has a thin, smooth thallus and ascomata with a thin margin bordering the pore and lacking a white rim. *Ocellularia flavoperforata* is very similar to the new species but has a pale yellow pigmented medulla.

Ocellularia dussii Lücking sp. nov.

Mycobank #811189.

FIGURE 6D.

TYPE: GUADELOUPE. Bois inférieurs des Bains-Jaunes, on *Inga laurina*, 1898, *A. Duss 1031b* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia carassensis* in the ascomata with broader pores and the smaller ascospores becoming brown.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 5 cm diam., continuous; surface smooth to uneven, light yellowish grey; prothallus absent. Thallus in section 40–60 µm thick, with dense, prosoplectenchymatous cortex, 10–15 µm thick, photobiont layer 30–50 µm thick, and indistinct medulla; photobiont layer and medulla with scattered clusters of calcium oxalate crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–12 × 6–10 µm. Ascomata rounded to slightly irregular in outline, erumpent to prominent, with complete thalline margin, 0.8–1.5 mm diam., 0.4–0.5 mm high; disc covered by 0.2–0.3 mm wide pore; proper margin distinct, entire, visible as thin, brown rim around the pore with inner yellowish-white zone; thalline margin entire, smooth, light yellowish grey. Excipulum entire, brownish yellow below, apically carbonized, 50–80 µm wide, fused with thalline margin; laterally covered by orange-brown, amorphous periderm and algiferous, corticate thallus containing scattered clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline to pale yellowish; hymenium 220–250 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched except a very narrow zone bordering the excipulum, there branched and anastomosing, apically smooth; periphysoids absent; asci fusiform to clavate, 200–230 × 30–40 µm. Ascospores 8 per ascus, obliquely uniseriate to irregularly arranged, ellipsoid-oval, muriform with 9–11 transverse and 3–5 longitudinal septa per segment, 50–60 × 15–20 µm, 2.7–3.5 times as long as wide, hyaline but eventually becoming light golden-brown, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – Named after Rev. Père Antoine Duss (1840–1924), collector of the type laterial and avid botanist in the Caribbean at the end of the 19th century.

DISTRIBUTION AND ECOLOGY. – Thus far known from Guadeloupe, without detailed information on its ecology.

DISCUSSION. – This new species is characterized by medium-sized, muriform ascospores, along with an apically carbonized excipulum, absence of a columella, and psoromic acid chemistry. Most similar is *Ocellularia carassensis* (Hale) Sipman, which differs in having a narrower pore and persistently hyaline ascospores that are about twice as large (Sipman et al. 2012). Only two other species of *Ocellularia* are known with medium-sized, muriform ascospores. *Ocellularia terrabensis* Kalb & Lücking differs by its irregular ascomata with a narrow pore, the dark brown, uncarbonized excipulum, presence of a carbonized columella, and lack of secondary substances. *Ocellularia interponenda* (Nyl.) Hale has a carbonized excipulum and columella, persistently hyaline ascospores, and produces salazinic acid.

***Ocellularia endoperidermica* Lücking sp. nov.**
Mycobank #811190.

FIGURE 6E–F.

TYPE: ECUADOR. PICHINCHA: 18 km NW of San Miguel de los Bancos, forest reserve of ENDESA, along path through middle of reserve, 00°05′N, 78°55′W, 800 m, wet, virgin forest, 27–29.xii.1983, *R.C. Harris 17905* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia microsorediata* in the endoperidermal, ecorticate thallus and the excavate soralia.

DESCRIPTION. – Thallus corticolous, endoperidermal, up to ca. 10 cm diam., continuous; surface uneven to bumpy, light gray to light brownish grey, with rounded to irregular, pale greenish grey, excavate soralia developing from pale bumps; prothallus absent. Thallus in section endoperidermal, ecorticate, with irregular photobiont layer 15–20 µm thick, dispersed between the uppermost periderm layers, lacking a distinct medulla. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 7–9 µm. Ascomata rounded, immersed to erumpent, with complete thalline margin, 0.3–0.5 mm diam., 0.15–0.2 mm high; disc covered by 0.05–0.1 mm wide pore; proper margin indistinct, entire, visible as thin, brownish or sometimes black rim around the pore. Excipulum entire, yellowish below, in upper half massively carbonized, 70–120 µm wide, fused with thalline margin; laterally covered by orange-brown periderm layers; columella absent in most ascomata, present in a few, plug-shaped, carbonized in upper half, up to 100 µm broad; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline; hymenium 120–130 µm high, hyaline, clear; epithecium indistinct, 7–10 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci oblong to cylindrical, 120–130 × 12–15 µm. Ascospores 8 per ascus, more or less uniseriately arranged, ellipsoid to oblong, 7–9-septate, 25–30 × 8–10 µm, 2.7–3.3 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet refers to the unusual, endoperidermal thallus of this species.

DISTRIBUTION AND ECOLOGY. – Known from tree trunks in lower montane rain forest in Ecuador.

DISCUSSION. – This new species is quite unusual in *Ocellularia* due to its endoperidermal, ecorticate thallus. All other species currently classified in the genus have an epiperidermal, usually distinctly corticate thallus. Morphologically the new species resembles members of the genus

Clandestinotrema, but the amyloid ascospores and the psoromic acid chemistry do not support a close relationship with that genus. The excavate soralia are also unusual. Currently, three other species of *Ocellularia* are known to produce soralia, small, transversely septate ascospores, and psoromic acid: *O. discoidea* (Ach.) Müll. Arg., *O. microsorediata* Rivas Plata & Lücking, and *O. soredica* Kalb. All three have epiperidermal, corticate, olive-green thalli and a different morphology of the soralia, and *O. discoidea* and *O. soredica* also differ in having a regularly present columella that is carbonized down to its base.

Ocellularia granpiedrensis Lücking sp. nov.

Mycobank #811191.

FIGURE 7A–B.

TYPE: CUBA. La Gran Piedra, SE of peak, 1000 m, in humid, secondary forest, 2.iv.1982, *R.C. Harris 14208* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia praestans* in the non-carbonized excipulum and lack of columella and from *O. carassensis* in the larger ascospores and subpsoromic acid as major compound.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface smooth to uneven, light greyish olive; prothallus absent. Thallus in section 60–100 µm thick, with dense, prosoplectenchymatous cortex with internal splitting, 15–25 µm thick, photobiont layer 15–25 µm thick, encrusted with numerous small, gray crystals, and medulla, 30–50 µm thick, strongly encrusted with clusters of calcium oxalate crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 6–10 µm. Ascomata rounded to slightly irregular in outline, erumpent to prominent, with complete thalline margin, 0.8–1.2 mm diam., 0.3–0.4 mm high; disc covered by 0.05–0.1 mm wide pore; proper margin distinct, entire to slightly fissured, visible as whitish rim around the pore; thalline margin very finely fissured, with radiating cracks running down the flanks of the ascomata, otherwise smooth, light greyish olive. Excipulum entire, orange-brown, 40–60 µm wide, fused with thalline margin; laterally covered by orange-brown, amorphous periderm and algiferous, corticate thallus containing a layer of clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline to pale yellowish; hymenium 250–320 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched except a narrow zone bordering the excipulum, there branched and anastomosing, apically smooth; periphysoids absent; asci fusiform to clavate, 200–250 × 30–40 µm. Ascospores 1 per ascus, oblong, richly muriform, 150–200 × 25–35 µm, 5–7 times as long as wide, hyaline, subdistoseptate with rounded to angular lumina, I+ violet-blue.

CHEMISTRY. – Subpsoromic acid; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet refers to the type locality, the famous “Big Rock” monolith in the Baconau Biosphere Reserve in eastern Cuba.

DISTRIBUTION AND ECOLOGY. – Found in moist secondary forest at mid elevation in Cuba.

DISCUSSION. – *Ocellularia granpiedrensis* resembles *O. praestans* (Müll. Arg.) Hale in the large, muriform ascospores and the secondary chemistry, being only the second species in the genus with subpsoromic acid as the major compound. Usually this substance occurs as a minor accessory substance together with psoromic acid. Both secondary compounds produce the same P+ yellow reaction in the medulla. The new species differs from *O. praestans* in the non-carbonized excipulum and lack of columella, and the finely fissured ascomata. It closely resembles the recently described *O. subcarassensis* Sipman & Lücking morphologically and in ascoma anatomy, but that species has much smaller ascospores and produces psoromic acid as the major compound (Sipman et al. 2012).

Ocellularia imshaugii Lücking sp. nov.

Mycobank #811192.

FIGURE 7C–D.

TYPE: JAMAICA. PARISH OF ST. ANDREW: John Crow Peak, 1750 m;, 27.iii.1953, *H.A. Imshaug 15354a* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia crocea* in the larger ascomata with pale yellow and red pigments and the larger ascospores.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 5 cm diam., continuous; surface verrucose, olive-green; prothallus absent. Thallus in section 100–150 µm thick, with dense, paraplectenchymatous cortex, 10–20 µm thick, photobiont layer 20–40 µm thick, and medulla, 70–100 µm thick, strongly encrusted with large clusters of calcium oxalate crystals and also with numerous small, gray crystals, in surface view white. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, dark olive-green, 8–11 × 6–10 µm. Ascomata rounded to somewhat irregular in outline, prominent to sessile, with nearly complete thalline margin, 1–1.5 mm diam., 0.3–0.4 mm high; disc covered by 0.1–0.2 mm wide pore; proper margin indistinct, becoming fissured, visible as thin, black teeth around the pore; thalline margin thick, irregularly fissured to lobulate and appearing layered in large ascomata, exposing a pale yellow, K+ orange medulla thinly mottled with a second, dark red, K+ green pigment, corticate portions olive-green. Excipulum brown below, apically or in upper half carbonized, 50–100 µm wide, laterally covered by brown, amorphous periderm and algiferous, corticate thallus containing large clusters of calcium oxalate crystals; columella present, carbonized, triangular to finger-like or becoming somewhat irregular, up to 150 µm broad; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline to pale yellowish; hymenium 130–150 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci oblong to fusiform, 130–140 × 20–25 µm. Ascospores 8 per ascus, irregularly arranged, oblong, 9–11-septate, 50–60 × 9–11 µm, 5–6 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Ascomata with two pigments, an unknown, pale yellow anthraquinone and dark red isohypocrellin; medulla P–, microscopic section K–; ascoma pigments K+ orange (pale yellow pigment) and K+ green (dark red isohypocrellin).

ETYMOLOGY. – Named after the late Henry A. Imshaug (1925–2010), collector of the type material and one of the most influential lichenologists in North America.

DISTRIBUTION AND ECOLOGY. – Found in a montane forest in Jamaica, without detailed information on its ecology.

DISCUSSION. – This new species somewhat resembles *Ocellularia crocea* (Kremp.) Overeem & D. Overeem in the ascomata with a fissured and layered margin, but the chemistry is different, with *O. crocea* having an orange pigment in the medulla of the ascomata. Also, the thallus in that species contains the cinchonarum unknowns and the ascospores are smaller. A pale yellow pigment is known from *O. fecunda* (Vain.) Hale, *O. polydiscus* Redinger, and *O. rubropolydiscus* M. Cáceres, Aptroot & Lücking (Cáceres et al. 2014), all also having medium-sized to large, transversely septate ascospores. However, *O. fecunda* has ascomata with an entire margin and a narrow pore and contains hypoprotocetraric acid, whereas *O. polydiscus* differs in the radially divided, gray disc and cinchonarum unknown chemistry. Both also lack a second pigment. *Ocellularia rubropolydiscus* does have an additional red pigment in the ascomata but the pigment reacts K+ purple and that species also contains the cinchonarum unknowns. The new taxon was originally identified as *O. xanthostroma* (Nyl.) Zahlbr., but that species has ascomata with a narrow pore and an entire margin, an orange medulla, and larger ascospores.

Ocellularia liamuiga Lücking sp. nov.

Mycobank #811193.

FIGURE 7E–F.

TYPE: FEDERATION OF ST. KITTS AND NEVIS. ST. PAUL CAPESTERRE PARISH AND ST. THOMAS MIDDLE ISLAND PARISH: St. Kitts, Mount Liamuiga Crater, trail from Belmont Estate to rim of crater, 17°22′N, 62°48′W, 350–900 m, moist forest (below) to elfin cloud forest (above), 5.ii.1996, *R.C. Harris 37898* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia conformis* in the areolate thallus, the ascomata immersed in irregular areolae, and the lack of a columella.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface uneven to shallowly verrucose-areolate, areoles often confluent to form large, irregular patches, thallus olive-gray with verrucae and areoles yellowish white; prothallus absent. Thallus in section 50–200 µm thick (thickest across the verrucae and areoles), with dense, prosoplectenchymatous cortex, 15–25 µm thick, photobiont layer 25–50 µm thick, and massive medulla in the verrucae and areoles, up to 150 µm thick, strongly encrusted with large clusters of calcium oxalate crystals and also with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, dark olive-green, 8–12 × 6–9 µm. Ascomata in large, rounded to irregular warts, erumpent to prominent, with nearly complete thalline margin, warts 1–2 mm diam., 0.3–0.4 mm high; disc covered by 0.1–0.2 mm wide pore; proper margin distinct, entire, visible as thin, white rim around the pore bordered by an irregular, brown zone intergrading with the yellowish white thallus later covering the ascoma warts. Excipulum entire, orange-brown below, apically or in upper half carbonized, 50–80 µm wide, fused with thalline margin; laterally covered by orange-brown, amorphous periderm and algiferous, corticate thallus containing large clusters of calcium oxalate crystals; columella absent; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline to pale yellowish; hymenium 120–150 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci oblong, 120–130 × 20–25 µm. Ascospores 1 per ascus, ellipsoid to oblong-oval, muriform with 7–11 transverse and 3–5 longitudinal septa per segment, 50–60 × 15–20 µm, 2.7–3.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet (a noun in apposition) refers to the type locality on Mount Liamuiga.

DISTRIBUTION AND ECOLOGY. – Thus far known from Jamaica, without detailed information about its ecology.

DISCUSSION. – *Ocellularia liamuiga* is morphologically and anatomically very characteristic, in forming large areoles and warts that contain the ascomata, and the small to medium-sized, muriform ascospores. The only other species in *Ocellularia* with similar ascospores and psoromic acid chemistry are *O. subcarassensis* Sipman & Lücking and *O. conformis* (Fée) Hale. Both differ morphologically in having smooth, olive-green thalli and ascomata that do not form irregular warts. *Ocellularia carassensis* also differs in its uncarbonized excipulum, whereas *O. conformis* has a columella that is carbonized.

Ocellularia macrospora Lücking sp. nov.

Mycobank #811194.

FIGURE 8A–C.

TYPE: PUERTO RICO. MAYAGÜEZ: Maricao State Forest, along Hatchery Trail off Hwy 120 at km 14.8, 700 m, moist broadleaf forest over serpentine, 1.vi.1988, *R.C. Harris 21931* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia domingensis* in the minutely grainular appearance of the thallus and ascomata caused by the presence of large, columnar crystal clusters.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 7 cm diam., continuous; surface densely verrucose and minutely grainy, light greyish yellow; prothallus absent. Thallus in section 100–200 µm thick, with dense, prosoplectenchymatous cortex, 10–20 µm thick, and irregular photobiont layer, 20–30 µm thick, developed in reticulate pattern between large, shortly columnar clusters of calcium oxalate crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular lines between the crystal clusters, olive-green, 8–12 × 6–9 µm. Ascomata rounded to mostly irregular in outline, prominent to sessile, with complete thalline margin, 0.8–1.2 mm diam., 0.4–0.5 mm high; disc covered by 0.1–0.15 mm wide pore; proper margin indistinct, entire, visible as thin, whitish rim around the pore; thalline margin entire, uneven and with minutely grainy surface, light yellowish to greenish grey. Excipulum entire, carbonized down to the base, 70–100 µm wide, fused with thalline margin; laterally covered by brown, amorphous periderm and algiferous, corticate thallus containing large, columnar clusters of calcium oxalate crystals; columella present, finger-like, carbonized, up to 100 µm broad and up to 400 µm high, often not reaching down to the base; hypothecium prosoplectenchymatous, 10–15 µm high, hyaline to pale yellowish; hymenium 350–400 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched except a very narrow zone bordering the excipulum, there branched and anastomosing, apically smooth; periphysoids absent; asci fusiform, 350–400 × 20–30 µm. Ascospores 1 per ascus, fusiform, 25–35-septate, 180–230 × 30–40 µm, 5–7 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Hypoprotocetraric and 4-*O*-demethylnotatic acids; medulla P–, microscopic section K–.

ETYMOLOGY. – The epithet refers to the rather large ascospores of this species.

DISTRIBUTION AND ECOLOGY. – Known from middle elevation rain forests in the Maricao State Forest in Puerto Rico.

DISCUSSION. – *Ocellularia macrospora* agrees with *O. domingensis* (Fée ex Nyl.) Müll. Arg., *O. henatomma* (Ach.) Müll. Arg., *O. granulifera* (Kremp.) Müll. Arg., and *O. triglyphica* (Kremp.) Zahlbr. in the carbonized, columellate ascomata, the very large ascospores, and the hypoprotocetraric acid chemistry without medullary pigment. All four species, however, differ in thallus anatomy, lacking the columnar crystal clusters that cause the thallus to have a minutely grainy surface. In that respect, *O. macrospora* resembles species of the *O. bahiana* group, which can be distinguished by lack of ascoma carbonization, mostly brown, small, muriform ascospores, and protocetraric acid as predominant secondary compound. The ascospores of *O. macrospora* are larger than in any other species of this group, with those of *O. domingensis* and *O. henatomma* reaching 200 × 40 µm and those of *O. granulifera* and *O. triglyphica* reaching 180 × 18 µm. *Ocellularia domingensis* was found close to the new species at the same locality, and the morphological differences are apparent.

Additional specimen examined. – **PUERTO RICO. MAYAGÜEZ:** same data as for the type, 1.vi.1988, *R.C. Harris 21939* (NY).

Ocellularia maricaoensis Lücking sp. nov.

Mycobank #811195.

FIGURE 8D.

TYPE: PUERTO RICO. MAYAGÜEZ: Maricao State Forest, just NW of Universidad Católica Estación Biológica, along Hwy 120 at km 15.8, 600 m, forest on slope with many tree ferns and palms, 5.vi.1988, *R.C. Harris 22311* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia perforata* in the verrucose-bullate thallus, the very narrow pore of the ascomata and the carbonized columella.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to 10 cm diam., continuous; surface coarsely verrucose to bullate, light olive-grey; prothallus absent. Thallus in section 100–200 µm thick, with dense, paraplectenchymatous cortex, 10–20 µm thick, photobiont layer, 20–40 µm thick, and thick medulla, 70–130 µm thick, strongly encrusted with large clusters of calcium oxalate crystals and both photobiont layer and medulla also encrusted with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 9–12 × 6–9 µm. Ascomata rounded to irregular in outline, erumpent, with complete thalline margin, 0.4–0.5 mm diam., 0.15–0.2 mm high; disc practically concealed by minute, 0.03–0.05 mm wide pore; proper margin indistinct, visible as thin, whitish rim around the pore; thalline margin entire, verrucose-bullate, light olive-grey. Excipulum entire, orange-brown, 15–25 µm wide, fused with thalline margin; laterally covered by thin, amorphous periderm layer and algiferous, corticate thallus layer with clusters of calcium oxalate crystals; columella present, finger-like, fully carbonized but often only developed in upper portion of the hymenium, up to 50 µm broad; hypothecium prosoplectenchymatous, 5–10 µm high, hyaline; hymenium 100–110 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci oblong to cylindrical, 90–100 × 8–10 µm. Ascospores 8 per ascus, more or less uniseriate, ellipsoid, 5-septate, 20–25 × 5–7 µm, 3.5–4.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Protocetraric and virensic acids; medulla P+ orange-red, microscopic section K–.

ETYMOLOGY. – The epithet refers to the type locality in the Maricao State Forest.

DISTRIBUTION AND ECOLOGY. – Known from lower montane rain forest in Puerto Rico.

DISCUSSION. – *Ocellularia maricaoensis* belongs in the difficult *O. perforata* complex (Lücking 2014). *Ocellularia perforata* s. str. differs in the distinctly ridged thallus and the larger ascomata with a much broader pore and uniformly dark brown but not carbonized excipulum and columella. The orange-brown excipulum and carbonized columella of *O. maricaoensis* agree with *O. violacea*, which also occurs in Puerto Rico. However, the latter has a smooth to uneven thallus with thin medulla and larger ascomata (up to 0.8 mm) with a much larger pore (0.1–0.2 mm), visible columella, and a smooth margin. This new species further underlines the importance of morphological characters in disentangling the complex of species centered around *O. perforata*. Until recently, specimens in this complex were identified based on chemistry and ascospore type only, without paying attention to thallus and ascoma morphology and anatomy (Lücking 2014). However, molecular phylogenetic studies indicate that such a broad concept does not reflect the reality, since species-level clades in *Ocellularia* are rather narrowly defined morphologically (Rivas Plata et al. 2012a; Kraichak et al. 2014).

***Ocellularia pichinchensis* Lücking sp. nov.**

Mycobank #811196.

FIGURE 8E–F.

TYPE: ECUADOR. PICHINCHA: 18 km NW of San Miguel de los Bancos, forest reserve of ENDESA, along path through middle of reserve, 00°05′N, 78°55′W, 800 m, wet, virgin forest, 27–29.xii.1983, *R.C. Harris 17927* (NY!, holotype).

DIAGNOSIS. – Differing from *Ocellularia perforata* in the smooth to uneven but not ridged thallus and the pale excipulum and lack of a columella.

DESCRIPTION. – Thallus corticolous on branches and lianas, epiperidermal, up to 10 cm diam., continuous; surface smooth to uneven, light olive-green to yellowish; prothallus absent. Thallus in section 100–120 µm thick, with dense, prosoplectenchymatous cortex, 10–20 µm thick, irregular photobiont layer 30–40 µm thick, and medulla, 50–70 µm thick, strongly encrusted with clusters of calcium oxalate crystals and also with numerous small, gray crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–12 × 6–8 µm. Ascomata rounded, erumpent to prominent, with complete thalline margin, 0.6–0.8 mm diam., 0.2–0.25 mm high; disc covered by 0.1–0.2 mm wide pore, flesh-colored, thinly white-pruinose; proper margin indistinct; thalline margin entire, smooth, light olive-green to yellowish. Excipulum entire, pale yellowish, 20–30 µm wide, fused with thalline margin; laterally covered by orange periderm layer, 40–60 µm thick, and algiferous, corticate thallus layer with medulla containing clusters of calcium oxalate crystals and numerous small, gray crystals; columella absent; hypothecium prosoplectenchymatous, 10–15 µm high, yellowish; hymenium 100–110 µm high, hyaline, clear; epithecium indistinct, 5–10 µm high, hyaline to greyish. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 100–110 × 11–13 µm. Ascospores 8 per ascus, more or less uniseriate, ellipsoid, 5–7-septate, 25–30 × 7–9 µm, 3–4 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Protocetraric and virensic acids; medulla P+ orange-red, microscopic section K–.

ETYMOLOGY. – The epithet refers to the province in Ecuador where the species was discovered.

DISTRIBUTION AND ECOLOGY. – Known from lower montane rain forest in Ecuador.

DISCUSSION. – This new species is rather non-descript but nevertheless distinct from any other known species in the genus. The small, transversely septate ascospores and protocetraric acid chemistry are shared with a number of species in the *Ocellularia perforata* complex, but all of these feature a distinct columella (Lücking 2014). Ecolumellate species with this combination of characters all have much smaller (up to 0.4 mm) immersed, myriotremoid ascomata (with a pore up to 0.1 mm wide) and are currently classified in the genus *Myriotrema*. The only morphologically similar species, with larger, prominent ascomata, is *O. bahiana* (Ach.) Frisch, but that species has dark brown, muriform ascospores and a minutely grainy thallus due to columnar crystal clusters.

Additional specimen examined. – **ECUADOR. PICHINCHA:** same data as for the type, *R.C. Harris 17829* (NY).

Pycnotrema fissurinum **Lücking sp. nov.**
Mycobank #811197.

FIGURE 9A–C.

TYPE: PUERTO RICO. ARECIBO: Cambalache Forest Reserve, just E of Garrochales, 175 m. mesic forest over limestone in mogotes, 11.vi.1988, *R.C. Harris 22580* (NY!, holotype).

DIAGNOSIS. – Differing from *Pycnotrema pycnoporellum* in the endoperidermal thallus and the partially fissurine ascomata.

DESCRIPTION. – Thallus corticolous, endoperidermal, up to 3 cm diam., continuous; surface smooth, light greyish yellow; prothallus absent. Thallus in section 30–50 µm thick, with thin, paraplectenchymatous cortex, 5–10 µm thick, and irregular photobiont layer immersed in the periderm, 20–30 µm thick. Photobiont *Trentepohlia*; cells rounded to irregular in outline, scattered or in irregular groups, yellowish green, 7–10 × 6–9 µm. Ascomata at first shortly lirelliform but later becoming rounded, usually aggregate in small, often linear groups, erumpent, with nearly complete thalline margin, 0.1–0.2 mm diam. when rounded or up to 0.2 mm long and 0.05 mm wide when elongate, 0.07–0.1 mm high; disc concealed or covered by 0.03–0.05 mm wide pore or slit; proper margin distinct, visible as dark, grey-brown rim around the pore or along the slit; thalline margin entire, light yellowish. Excipulum entire, prosoplectenchymatous, hyaline, 10–20 µm wide, fused with thalline margin; laterally covered by corticate thallus layer; columella absent; hypothecium prosoplectenchymatous, 5–8 µm high, hyaline; hymenium 70–80 µm high, hyaline, clear; epithecium indistinct, 3–5 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci fusiform, 70–80 × 20–25 µm. Ascospores 8 per ascus, irregularly arranged, ellipsoid, submuriform with 3–5 transverse and 0–1 longitudinal septa per segment, 15–25 × 10–12 µm, 1.5–2 times as long as wide, hyaline, subdistoseptate with rounded to angular lumina and thick outer wall (1–2 µm), I+ violet-blue.

CHEMISTRY. – No substances detected by TLC.

ETYMOLOGY. – The epithet refers to the partially fissurine ascomata of this species.

DISTRIBUTION AND ECOLOGY. – Known from mesic forest growing on large limestone outcrops (mogotes) in Puerto Rico.

DISCUSSION. – *Pycnotrema fissurinum* provides a missing link between *P. pycnoporellum* and *Fissurina*, explaining why the *P. pycnoporellum* is nested within *Fissurina* s. lat. (Rivas Plata et al. 2013). In the new species, the ascomata are both rounded (as in *Pycnotrema*) and lirellate (as in *Fissurina*), on the same thallus and often in characteristic arrangement, with the central ascomata in a group more rounded and peripheral ascomata lirellate. A further difference between *P. pycnoporellum* and the new species is the well-developed epiperidermal thallus in the first versus the thin, endoperidermal thallus in the latter. Ascospores in *P. fissurinum* appear to be relatively slightly broader than in *P. pycnoporellum*, but that difference is minor and needs to be assessed statistically with more material.

Rhabdodiscus trinitatis **Lücking sp. nov.**

Mycobank #811198.

FIGURE 9D–F.

TYPE: TRINIDAD AND TOBAGO. TRINIDAD: Southern Watershed Reserve, 28.iii.1920, *N.L. Britton et al. 1121* (NY!, holotype).

DIAGNOSIS. – Differing from other species of *Rhabdodiscus* in the non-carbonized excipulum combined with a columella formed by thin, carbonized strands and a minutely grainy thallus.

DESCRIPTION. – Thallus corticolous, epiperidermal, up to ca. 10 cm diam., continuous; surface uneven to grainy, rough, as if frosted, light greenish grey; prothallus absent. Thallus in section 100–200 µm thick, with dense, prosoplectenchymatous cortex, 3–5 µm thick, irregular photobiont layer 40–70 µm thick, and medulla, 50–100 µm thick, both photobiont layer and medulla with large, columnar clusters of calcium oxalate crystals visible as minute, translucent grains on the surface. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 7–10 µm. Ascomata rounded to slightly irregular in outline, erumpent to prominent and old ascomata becoming sessile, with complete thalline margin, 0.8–1.2(–2) mm diam., 0.4–0.5 mm high; disc covered by 0.4–0.6(–1) mm wide pore, almost filled with immersed, white-topped columella; proper margin indistinct, entire, visible as thin, brown rim around the pore; thalline margin entire, rough, white. Excipulum entire, orange-yellow, 40–60 µm wide, fused with thalline margin; laterally covered by algiferous, corticate thallus with columnar clusters of calcium oxalate crystals; columella present, irregular, appearing plug-shaped from above but forming numerous, thin strands dividing the hymenium in narrow chambers and thinly continuous below, dark brown to carbonized, above the hymenium with thick, crystalline cover; hypothecium prosoplectenchymatous, 10–15 µm high, yellow; hymenium 120–140 µm high, hyaline, clear; epithecium indistinct, 10–15 µm high, hyaline. Paraphyses unbranched, apically smooth; periphysoids absent; asci cylindrical to clavate, 110–120 × 8–10 µm. Ascospores 8 per ascus, uniseriate, oblong, 3–5-septate, 12–16 × 4–5 µm, 2.7–3.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, I+ violet-blue.

CHEMISTRY. – Psoromic, subpsoromic, and 2'-O-demethylpsoromic acids; medulla P+ yellow, microscopic section K–.

ETYMOLOGY. – The epithet refers to the type locality.

DISTRIBUTION AND ECOLOGY. – Known from the island of Trinidad, with no additional data about its ecology.

DISCUSSION. – This species is provisionally placed in the genus *Rhabdodiscus* because of the columella structure, general habit, and psoromic acid chemistry. It differs from all other species in the genus by the non-carbonized, orange-yellow excipulum, whereas the carbonized, complex columella agrees with several species in *Rhabdodiscus*. Placement in the genus *Stegobolus* was considered as an alternative, but species of that genus usually have a felty ascoma margin and the columella does not form thin, carbonized strands. The thallus structure of *R. trinitatis*, with large, columnar crystals, is reminiscent of the Asian species *R. marivelensis* (Vain.) Rivas Plata, Lücking & Lumbsch, which differs in its carbonized excipulum and submuriform, brown ascospores. Species of the *Ocellularia bahiana* group, such as *O. auberianoides* (Nyl.) Müll. Arg., might also look similar, but differ in the non-carbonized columella and protocetraric acid chemistry. Two species of *Glaucotrema* have a complex columella and placement in that genus is a viable alternative, but without molecular data a more conservative placement is preferred here.

II – NEW COMBINATIONS

***Ocellularia rudior* (Vain.) Lücking comb. nov.**
Mycobank #811198.

≡ *Thelotrema rudius* Vain., Ann. Acad. Sci. Fenn., ser. A, 6(7): 135. 1915. **TYPE:** Guadeloupe, 1897, *P. Duss 152* (TUR-Vainio 26790!, holotype)
≡ *Leptotrema rudius* (Vain.) Zahlbr., Cat. Lich. Univers. 2: 639. 1923.

FIGURE 16C–D.

DISCUSSION. – This name is resurrected here for specimens in the *Ocellularia bahiana* complex with massive, complex columella. Previously, the name *O. obturascens* (Nyl.) Hale had been used for columellate specimens (e.g., Hale *in* Egan 1987; Sipman et al. 2012), and Sipman et al. (2012) listed *Thelotrema rudius* as a synonym of *O. obturascens*. However, if a single, columellate taxon is recognized, the epithet "*rudius*" takes precedence over the epithet "*obturascens*", since the latter was elevated to the species level much later (Hale 1970) than the original description of *T. rudius* by Vainio (1915).

While Harris (1990) considered the columellate forms to represent the same species as *Ocellularia bahiana*, the situation might actually be more complex than recognizing a separate, columellate taxon, since the columellate forms vary considerably in morphology and this variation is correlated with ascoma shape and geography. The populations in eastern North America (Hale 1970; Hale *in* Egan 1987; Harris 1990, 1995; Lücking et al. 2011) invariably feature regularly rounded, pored ascomata with an even surface, a thick margin, and a generally simple, thick, white-covered columella largely filling the pore. Similar specimens are also known from the Caribbean (see section III below under *O. obturascens*). Scattered populations from Central and northern South America exhibit more open ascomata in which part of the ascomata feature sterile excipular bridges dividing the pore and sometimes connected to a central columella emerging from below the hymenium (Sipman et al. 2012). A third morph is represented by specimens exclusively found in the Caribbean, cited below, with the ascomata becoming widely open and a massive, initially simple but becoming complex, lobulate to radiating columella with a thick white cover completely filling the disc (Figure 16C–D); in these specimens, the ascoma margin is typically bumpy and somewhat angular.

Among the names described for such columellate forms (Sipman et al. 2012), the type of *Thelotrema bahianum* var. *obturascens* Nyl. (*Lindig 719*; H-NYL!) appears to fit the eastern North American and Caribbean forms with simple columella filling the pore, whereas the type material of *T. epitrypum* f. *simplicius* Nyl. from Colombia (*Lindig 2580*; H-NYL!), as well as the type of *T. bahianum* var. *ruptum* Nyl. (*Lindig 825*; H-NYL!), correspond to the form with sterile bridges dividing the pore. The type material of *T. rudius* from Guadeloupe (cited above) appears to come closest to the morph with bumpy ascomata and massive columella, although the columella remains mostly simple. This complex is in need of a detailed molecular and morphological study and might represent a model case of a recent geographical radiation.

Additional specimens examined. – **JAMAICA. ST. ANN PARISH:** 1.4 mi W of Discovery Bay, vicinity of Discovery Bay, Marine Laboratory, 18°28'N, 77°25'W, sea level, dry forest over very rough limestone by seam base of tree, 23.iv.1981, *W.R. Buck 6019* (NY). **TRELAWNY PARISH:** NW of Troy Nr. Crown Lands Road extension 4.5–5 mi, 530–610 m, on bark of *Acidocroton*, 26.i.1975, *G.R. Proctor 34721* (NY). **CUBA. ORIENTE:** Boca del Jaibo, 29.ix.1921, *Bro. Hioram 5521* (NY). **DOMINICAN REPUBLIC. ALTAGRACIA:** 5.5 km S of La Romana-Higuey Hwy on road to Bayahibe, 18°24'N, 68°50'W, sea level, dry forest over karst limestone, 22.i.1991, *R.C. Harris 26584* (NY). **DISTRITO NACIONAL:** Sierra Prieta, 18 km NW of Villa Mella on road to Yamasá, 18°39'N, 69°58'W, 250 m, original scrub forest on mesic serpentine hill, 18.i.1987, *R.C. Harris 20192* (NY). **PEDERNALES:** 3.5 km

SSW of Las Mercedes, 5 km N of intersection of road from Oviedo to Pedernales, 18°02′N, 71°38′W, 240 m, dry forest, 14.iii.1981, *W.R. Buck 4506* (NY).

***Phaeographis spondaica* (Nyl.) Lücking comb. nov.**

Mycobank #811198.

≡ *Thelotrema spondaicum* Nyl., Ann. Sci. Nat., Bot., Sér. 4, 19: 330. 1863. **TYPE:** Cuba, *C. Wright s.n.* (FH!, holotype).
≡ *Leptotrema spondaicum* (Nyl.) Zahlbr., Cat. Lich. Univers. 2: 640. 1923.

= *Graphis lecanographa* Nyl, Flora 52: 123. 1869. **TYPE:** Brazil, 1867, *A. F. M. Glaziou 2014* (H-Nyl 7449!, holotype).
≡ *Graphina lecanographa* (Nyl.) Müller Arg., Flora 63: 41. 1880.
≡ *Phaeographina lecanographa* (Nyl.) Müller Arg., Flora 65: 399. 1882.
≡ *Phaeographis lecanographa* (Nyl.) Staiger, Bibl. Lichenol. 85: 334. 2002.

FIGURE 17A.

DISCUSSION. – The type of *Thelotrema spondaicum* agrees morphologically and chemically with the type of *Graphis lecanographa* and provides an earlier epithet for this species.

Additional specimens examined. – **HONDURAS. COMAYAGUA:** from Agua Amarilla to San José de los Planes, 11–15 km of Lake Yojoa, 14°47′N, 87°51′W, 1300–1700 m, 14.iii.1993, *B.H. Allen 14014A* (NY). **COSTA RICA. ALAJUELA:** San Ramón, 1.ii.1931, *A.M. Brenes 14479* (NY). **JAMAICA. CLARENDON PARISH:** along road between Ritchies and Balcarres, 915 m, 24.iv.1974, *G.R. Proctor 33792* (NY), *G.R. Proctor 33795* (NY). **CUBA. SANTIAGO DE CUBA:** La Gran Piedra W of peak, just N of lodge, 1000 m, pine forest with remnants of moist hardwoods, 2.iv.1982, *R.C. Harris 14127* (NY); La Gran Piedra, from base of peak near lodge to summit, 1000–1200 m, dry near base with pines and boulders, humid hardwoods at summit, 4.iv.1982, *R.C. Harris 14317* (NY). **DOMINICAN REPUBLIC.** Cerrazo, from Santiago to La Cumbre, Cordillera Septemtrional, 750 m, 16.viii.1958, *C.M. Wetmore & H.A. Imshaug 3840* (NY). **PUERTO PLATA:** Cordillera Septentrional, Loma Isabel de Torres, 19°46′N, 70°42′W, 700–770 m, humid broadleaf forest at and just below summit, 20.i.1991, *W.R. Buck 19210* (NY). **PUERTO RICO. MAYAGÜEZ:** Maricao State Forest just NW of Universidad Católica Estación Biológica, along Hwy 120 at km 15.8, 600 m, forest on slope with many tree ferns and palms, 5.vi.1988, *R.C. Harris 22318* (NY); Maricao State Forest along Hwy 120 at km 16.8, 1 km W of Universidad Católica Estación Biológica, 600 m, dry, thorny shrub, 3.vi.1988, *R.C. Harris 22145* (NY), *R.C. Harris 22157* (NY), *R.C. Harris 22189* (NY), *R.C. Harris 22202* (NY), *R.C. Harris 22205* (NY); Maricao State Forest Hwy 120 at km 16.2, 0.5 km W of Universidad Católica Estación Biológica, just W of picnic area, 600 m, semi-dry scrub forest with ca. 10 m high canopy, 3.vi.1988, *R.C. Harris 22109* (NY); Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *W.R. Buck 16010* (NY). **PONCE:** Cordillera Central, Caribbean National Forest, Toro Negro Division along Hwy 143 at km 20, 1000–1200 m, lower montane wet broad-leaf-palm-tree fern forest on windward slope, 2.vi.1988, *R.C. Harris 22045* (NY), *R.C. Harris 22069C* (NY). **GUADELOUPE.** Camp Jacob, 1898, *P.A. Duss 466a* (NY). **VENEZUELA. LARA:** Serranía de Ziruma or Empalado, surroundings of Cerro Azul, 1890 m, corticolous, 17.viii.1979, *M. López Figueiras & R.C. Wingfield 21594* (NY). **FALCÓN:** Sierra Ziruma or Empalado, Cerro Socopo, 1300 m, corticolous, 14.iii.1980, *M. López Figueiras & R.C. Wingfield 22597* (NY), *22618*, *M. López Figueiras & R.C. Wingfield 22625* (NY). **BRAZIL. BAHIA:** Serra da Agua de Rega, 23 km N of Seabra, road to Agua da Rega, 1000 m, Cerrado with occasional tree islands, 24.ii.1971, *H. Irwin et al. 30946S* (NY).

III – DISCUSSION OF A FORGOTTEN SPECIES

***Polistroma fernandezii* Clemente**

FIGURE 17B–D.

DISCUSSION. – This name is used here provisionally for a taxon that has rarely been reported in the literature, characterized by its unique growth with vertically proliferating ascomata. While this taxon clearly belongs in Graphidaceae, its exact systematic position within the family is unknown. The ascomata somewhat resemble those of the genus *Topeliopsis*, but the thallus structure and the ecology, being found in lowland Amazon rainforest throughout northern South America, are quite different.

The species was described based on neotropical material as *Ozocladium leprieurii* Mont. (Montagne 1851), but that name was later synonymized with *Polistroma fernandezii* Clemente (Krempelhuber 1869; Hue 1910; Zahlbruckner 1923; as *Polystroma ferdinandezii*), a name based on material supposedly collected in southern Spain (Clemente 1807). Material from South America was illustrated with the name *Polistroma* (as *Polystroma*) *fernandezii* by Jørgensen (1993). The occurrence of *Polistroma fernandezii* (as *Polystroma ferdinandezii*) in Spain was maintained in major European revisionary works (Poelt 1969; Clauzade & Roux 1985) and in the checklist of lichens from the Iberian Peninsula (Llimona & Hadun 2001). However, it appears improbable that a species found in lowland Amazon rain forest should also be present in the chiefly mediterranean climate of southern Spain. Besides the unlikely scenario that the same species indeed occurs in the Neotropics and in Spain, two alternatives have to be considered: (1) two different species are involved, in which case the neotropical material should be named *Ozocladium leprieurii* and the identity of *Polistroma fernandezii* remains to be clarified; (2) there was a mixup of the material studied by Clemente (1807) and that material actually is from South America, not from Spain. I have been unable to locate authentic type material of *Polistroma fernandezii* (assumed to be either in MA or MJSD) to clarify the issue.

There is also some confusion with the spelling of the epithet "*fernandezii*" and, consequently, the validity of the name itself. Clemente (1807) originally named the species "*Polistroma* Fernandez" [sic]. This was corrected to, and validated as, *Polistroma fernandezii* by Acharius (1814), but later changed into *Polystroma ferdinandezii* (Zahlbruckner 1923). The latter epithet is incorrect since the species was named after Fernández (as surname), not after a King Ferdinand as often assumed, and the correct Latinization is thus "*fernandezii*". Also, the correction of *Polistroma* into *Polystroma* is not allowed by the Code (ICN Art. 60), since *Polistroma* is to be considered a deliberate Latinization. Since the original epithet "Fernandez" is considered an incorrect, but not invalid "Latinization" (F. Barrie, pers. comm. 2014), the correct citation of this genus and species should thus be *Polistroma* Clemente and *Polistroma fernandezii* Clemente. However, the use of this name for the neotropical species is pending, depending on the nature of its type material.

Specimens examined. – **SURINAME. SIPALIWINI:** El Dorado Falls, 3 km NE of Blanche Marie guest house, by stream above falls, 4°45′N, 56°53′W, 50–100 m, twig, 11.vi.1997, *R.A. Pursell 11737* (NY); Table Mountain Camp No. II, Savanna No. VIII, foliicolous or on thin twigs, 26.viii.1944, *B. Maguire 24507F* (NY). **FRENCH GUIANA. SINNAMARY:** Piste de St. Elie, 21 km SSW of Sinnamary, 5°20′N, 53°00′W, tropical moist forest twigs, full shade, 3.viii.1982, *B. Boom & S. Mori 1490* (NY). **BRAZIL. AMAZONAS:** Manaus, perto da Cidade Nova, primary forest foliicolous or on thin twigs, 29.viii.1984, *B.W. Nelson 1342* (NY); Rios Pacaya and Muriapiranga, 0–5 km S of Rio Muriapiranga, 2°33′ to 2°50′S, 50°38′ to 50°50′W, terra firme forest, 10.x.1965, *G. Prance et al. 1590* (NY); Manaus-Porto Velho road, section Castanho-Tupana, 7.vii.1972, *M.F. Silva et al. 36088* (NY); Distrito Agropecuário, Reserva 1501 (km 41) of the WWF/INPA MCS Project, 2°24′ to 2°26′S, 59°44′ to 59°46′W, 50–125 m, non-flooded moist forest on Myrtaceae twig, 3.xii.1988, *B. Boom et al. 8727* (NY).

IV – PARTIALLY ANNOTATED LIST OF ADDITIONAL IDENTIFICATIONS

In the light of greatly improved genus and species concepts in the family Graphidaceae, most historical and more recent identifications of herbarium material up to the end of the 20th century do not reflect correct names or are often broadly inclusive. Where appropriate, prior identifications are cited to alert the reader to use of these incorrect names in earlier publications. Even in cases where earlier identifications were confirmed or represent the correct epithet under an earlier generic concept, it appears that many of these names have never been published and at least in part represent range extensions for given species. To make these data broadly available in published form, a list is presented of all further identifications made on collections of thelotremoid Graphidaceae housed at NY as part of this study. Specimens that are particularly well developed and represent the typical form of a given species, or are otherwise rarely depicted with images, are illustrated here in order to document morphological characters helpful to confirm identifications.

Acanthotrema brasilianum **(Hale) Frisch – PUERTO RICO. PONCE:** Cordillera Central, above Villalba, Doña Juana Recreation Area, 800–1000 m, wet broadleaf-palm forest on leeward slope, 2.vi.1988, *R.C. Harris 21988* (NY).

Ampliotrema auratum **(Tuck.) Kalb ex Kalb – CUBA. ORIENTE:** Sierra Nipe, near Woodfred, 450–550 m, deciduous woods and thickets, 1.xii.1909, *J.A. Shafer 3360* (NY).

Ampliotrema discolor **(Ach.) Kalb ex Kalb. – PANAMA. PANAMA:** Cerro Jefe, 1000 m, premontane rain forest, cloud forest dominated by *Clusia* spp. and *Colpothrinax cookii*, 14.vii.1975, *S. Mori 7136* [NY; as *Ocellularia verrucosa* (Fée) Hale].

Ampliotrema lepadinoides **(Leight.) Kalb ex Kalb – BRAZIL. AMAZONAS:** Ilha Acarabu, in Rio Negro at mouth of Rio Marie, 00°25′S, 66°25′W, flood plain forest on tree trunk, 4.vii.1979, *W.R. Buck 2327* (NY; as *Ocellularia megalostoma* Müll. Arg.).

Ampliotrema megalostoma **(Müll. Arg.) M. Cáceres & Lücking – VENEZUELA. AMAZONAS:** Atabapo, surroundings of Culebra community, between Cerro Duida and Cerro Huachamacari, 03°40′N, 65°45′W, 200–400 m, Amazon forest interrupted by small savannas, 28.i-9.ii.1982, *M. Guariglia et al. 1439* (NY). **BRAZIL. AMAZONAS:** Rio Negro, between 100 and 200 km above Manaus, 40 m, rain forest, 14-18.x.1980, *K. Kalb s.n.* (NY); Ilha Acarabu, in Rio Negro at mouth of Rio Marie, 00°25′S, 66°25′W, flood plain forest, 4.vii.1979, *W.R. Buck 2327* (NY).

Ampliotrema palaeoamplius **(Aptroot & Sipman) Kalb ex Kalb – NORTH GRANADA:** unknown locality, *J.H. Hart 81* [NY; as *Ocellularia lepadinoides* (Leight.) Zahlbr.].

Anomomorpha lecanorina **Sipman – VENEZUELA. AMAZONAS:** Atabapo, Cerro Marahuaca cumbre, 03°35′N, 65°20′W, 2480–2580 m, swampy plateau (altiplano) with exposed rocks, 31.i-10.ii.1982, *M. Guariglia et al. 1663* (NY). – Recently described from Ecuador (Lumbsch et al. 2011); this is the first report for Venezuela (**FIGURE 10A**).

Chapsa albomaculata **(Sipman) Sipman & Lücking. – VENEZUELA. AMAZONAS:** along Río Mawarinuma, just outside Cañon Grande vicinity of Neblina base camp, 00°50′N, 66°10′W, 140 m, low primary forest on white sand, 9.iii.1984, *W.R. Buck 11449* (NY); just outside Cañon Grande along trail 1.5-2 hours walk S of Neblina base camp to Río Agua Blanca, 00°50′N, 66°10′W, 150 m, low primary forest on white sand along white water river, 9.ii.1985, *W.R. Buck 12871* (NY).

Chapsa diploschistoides **(Zahlbr.) Frisch – (FIGURE 10B). TRINIDAD AND TOBAGO. TRINIDAD:** Ecclesville to Mayaro, Bridle Trace, 19.v.1957, *H. Fleming s.n.* (NY).

Chapsa farinosa **Lücking & Sipman – PUERTO RICO. SAN JUÁN:** 3 mi E of Santurce on tree trunk, 1899, *A.A. Heller 454* (NY).

Chapsa platycarpa **(Tuck.) Frisch – PUERTO RICO. ARECIBO:** Cambalache Forest Reserve, just E of Garrochales, 175 m, mesic forest over limestone in mogotes, 11.vi.1988, *R.C. Harris 22576* (NY).

Chapsa referta **(Hale) Lücking – BRAZIL. AMAZONAS:** Along Igarapé Caititu, off Rio Uatumã at Antônio Filinto (old rosewood factory), 01°45′S, 59°40′W, campina, 18–19.viii.1979, *W.R. Buck 2943* (NY).

Chapsa sublilacina **(Ellis & Everh.) Sipman & Lücking – PUERTO RICO. LUQUILLO:** Caribbean National Forest, Luquillo Division, El Yunque Recreation Area Big Tree Trial to La Mina Falls, 500 m, moist forest, 5.iii.1981, *W.R. Buck 4086* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** 4 mi E of Arima; 15.iii.1920, *N.L. Britton et al. 646* (NY); Southern Watershed Reserve, on live tree, 28.iii.1920, *N.L. Britton et al. 1120* (NY). **BRAZIL. BAHIA:** Municipio of Ilheus, area do CEPEC (Centro de Pesquisas do Cacao), km 22 on road between Ilheus and Itabuna (BR 415), southern Bahia hygrophilous forest, 13.v.1991, *A.C.M. de Almeida & S.L. Oliveira 4* (NY).

Chapsa subpatens **(Hale) Mangold – PUERTO RICO. MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21912A* (NY).

Clandestinotrema analorenae **Lücking – DOMINICA. PARISHES OF ST. PAUL AND ST. DAVID:** summit area of Morne Trois Pitons, 1200–1400 m, 11.xi.1963, *H.A. Imshaug & F. Imshaug 32868* (NY; as *Thelotrema leucomelaenum* Nyl.). **PARISH OF ST. PETER:** ridge from Morne Diablotin summit to Syndicate Estate, 1000–1300 m, elfin woodland, 14.xi.1963, *H.A. Imshaug & F. Imshaug 32942* (NY; as *T. leucomelaenum*). – Recently described from Costa Rica (Sipman et al. 2012); this is the first report for Dominica (**FIGURE 10C**).

***Clandestinotrema clandestinum* (Ach.) Rivas Plata, Lücking & Lumbsch – (FIGURE 10D). DOMINICAN REPUBLIC. PEDERNALES:** Las Abejas, 52 km N of port of Cabo Rojo on Alcoa road, 1160 m, *Podocarpus*-dominated forest, 7.v.1982, *R.C. Harris 15582* (NY; as *Ocellularia stylothecia* (Vain.) Aptroot). **FEDERATION OF ST. KITTS AND NEVIS. ST. PAUL CAPESTERRE PARISH AND ST. THOMAS MIDDLE ISLAND PARISH:** St. Kitts, Mount Liamuiga Crater Trail from Belmont Estate to rim of crater, 17°22′N, 62°48′W, 350–900 m, moist forest (below) to elfin cloud forest (above), 5.ii.1996, *R.C. Harris 37930* (NY; as *O. stylothecia*).

***Clandestinotrema leucomelaenum* (Nyl.) Rivas Plata, Lücking & Lumbsch – DOMINICA. PARISHES OF ST. PAUL AND ST. DAVID:** summit area of Morne Trois Pitons, 1200-1400 m, 11.xi.1963, *H.A. Imshaug & F. Imshaug 32868* (NY).

***Clandestinotrema maculatum* (Hale) Rivas Plata, Lücking & Lumbsch – FEDERATION OF ST. KITTS AND NEVIS. ST. THOMAS MIDDLE ISLAND PARISH:** St. Kitts, Wingfield Manor Estate, 17°20′N, 62°47′W, 400–450 m, semi-moist forest on steep slope, 12.ii.1996, *R.C. Harris 38252* (NY).

***Clandestinotrema stylothecium* (Vain.) Rivas Plata, Lücking & Lumbsch – CUBA. SANTIAGO DE CUBA:** vicinity of Museo de la Francesca, La Gran Isabelita, 2 km SE of La Gran Piedra, 1000 m, open secondary forest on ridge, 7.vi.1982, *R.C. Harris 14606* (NY), *R.C. Harris 14596* (NY).

***Clandestinotrema tenue* (Hale) Rivas Plata, Frisch & Sipman – PUERTO RICO. HUMACAO:** Caribbean National Forest, Luquillo Division, El Toro Mountain trail from El Verde side on Hwy 186, 1000–1074 m, mossy cloud forest at summit, 4.vi.1988, *R.C. Harris 22259* (NY). **ECUADOR. PICHINCHA:** 18 km NW of San Miguel de los Bancos, forest reserve of ENDESA, 00°05′N, 78°55′W, 800 m, wet, virgin forest on felled tree, 27–29.xii.1983, *R.C. Harris 17916* (NY).

***Cruentotrema amazonum* M. Cáceres, Aptroot & Lücking – (FIGURE 10E). BRAZIL. AMAZONAS:** slopes and summit of Serra do Chocador, W shore of Rio Uatumã, 01°37′N, 59°40′W, terra firme forest, 22.viii.1979, *W.R. Buck 3064* (NY).

***Diorygma confluens* (Fée) Kalb, Staiger & Elix – PANAMA.** Marraganti and vicinity, 0-60 m, 3-9.vi.1908, *R.S. Williams 1103* (NY; as *Leptotrema microsporum* Zahlbr.).

***Fibrillithecis confusa* Lücking, Kalb & Rivas Plata – BAHAMAS.** Andros, Nicholl's Town and vicinity, on bark, 13–15.iii.1907, *L. Brace 6909* (NY; as *Leptotrema microsporum*). **JAMAICA.** Between eastern Blue Mountain Peak and Sugarloaf, 2000-2200 m, steep forest slope on bark, 8.vii.1926, *W.R. Maxon 9965a* (NY; as *L. microsporum*).

***Glaucotrema glaucophaenum* (Kremp.) Rivas Plata & Lumbsch – VENEZUELA. BOLÍVAR:** Chimantá Massif, along Río Tirica between La Laja and base camp rain forest, 485–490 m, 21.i.1955, *J. Steyermark & J. Wurdack 178* (NY).

***Glaucotrema stegoboloides* M. Cáceres, Aptroot & Lücking – BRAZIL. BAHIA:** Municipality of Itanagra, road from Itanagra to Subaúma, 8 km W of Itanagra, 50 m, slightly disturbed primary forest on bark, full shade, 26.v.1981, *B. Boom & S. Mori 938* (NY; as *Myriotrema glaucophaenum* (Kremp.) Hale). – Recently described from Amazonian Brazil (Cáceres et al. 2014); this is the first report for northeastern Brazil (**FIGURE 10F**).

***Graphis mexicana* (Hale) Kalb, Lücking & Lumbsch – ECUADOR. AZUAY:** 26 km S of Sigsig on road to Gualaquiza, at junction of road to Recinto Militar, 03°08′S, 78°49′W, 3249 m, roadside wetland and remnant cloud forest, 24.v.2001, *W.R. Buck 39336* (NY; as unidentified Thelotremataceae).

***Gyrotrema sinuosum* (Sipman) Frisch – (FIGURE 11A). VENEZUELA. AMAZONAS:** along Río Mawarinuma, just outside Cañon Grande vicinity of Neblina base camp, 00°50′N, 66°10′W, 140 m, low primary forest on white sand, 21.ii.1984, *W.R. Buck 11047* (NY), 9.iii.1984, *W.R. Buck 11453* (NY).

***Leptotrema wightii* (Tayl.) Müll. Arg. – MEXICO. SAN LUIS POTOSI:** Las Palmas, 6.vi.1890, *C.G. Pringle 231* (NY). **CUBA. LAS VILLAS:** Trinidad Mountains, near Buenos Aires, 750–900 m, 6–10.iii.1941, *G.T. Johnston s.n.* (NY). **PINAR DEL RÍO:** San Diego de Los Baños, along river and in virgin forest on dead wood, 8-10.iii.1905, *F.S. Earle & W.A. Murrill 227* (NY). **SANTIAGO DE CUBA:** Alto Cedro, low dense virgin forest on dead wood, 19-20 .iii.1905, *F.S. Earle & W.A. Murrill 472* (NY). **ISLA DE LA JUVENTUD:** San Juán [Isle of Pines], Cerros de San Juán, 15-17.iii.1916, *N.L. Britton et al. 15500* (NY). **DOMINICAN REPUBLIC.**

ALTAGRACIA: 5.5 km S of La Romana-Higuey Hwy on road to Bayahibe, 18°24′N, 68°50′W, sea level, dry forest over karst limestone, 22.i.1991, *R.C. Harris 26569* (NY). **BARAHONA:** behind Puerto Alejandro, on lower slopes of Sierra Martin Gracia, 18°19′N, 71°02′W, 150 m, dry sclerophyll/cactus forest, 12.iii.1981, *W.R. Buck 4250* (NY). **PUERTO RICO. MONA ISLAND:** near Playa Sardinera, along cliff face at base of plateau from Cueva Negra towards Punta Arenas, 18°05′N, 67°56′W, 5-35 m, mesic forest dominated by *Cocos*, *Ficus* and *Triphasia* over rough limestone, 18.ii.1996, *W.R. Buck 30039* (NY). **FEDERATION OF ST. KITTS AND NEVIS. ST. GEORGE BASSETERRE PARISH:** St. Kitts Hill just S of St. Anthony's Peak, 17°14′N, 62°38′W, 20 m, dry forest; 11.ii.1996, *W.R. Buck 29810* (NY). **BRAZIL. BAHIA:** Municipio of Ilheus, area do CEPEC (Centro de Pesquisas do Cacao), km 22 on road between Ilheus and Itabuna (BR 415), southern Bahia hygrophilous forest, growing on tree in shade, 9.iv.1991, *A.C.M. de Almeida & S.L. Oliveira 14* (NY). **MATO GROSSO:** 35 km SE of Cuiaba, 120 m, light Cerradão, 4.vii.1980, *K. Kalb s.n.* (NY). **MINAS GERAIS:** Municipality of Lagoa Santa, Gruta da Lapinha, 19°32′N, 43°57′W, 700 m, jagged dolomite, 17.ix.1984, *D. Vital & W.R. Buck 11841* (NY). **ARGENTINA. MISIONES:** Dept. San Ignacio, Teyucuaré, 235 m, trees in forest, 21.viii.1957, *J.E. Montes 12240a* (NY).

***Leucodecton bisporum* (Nyl.) Sipman & Lücking – TRINIDAD AND TOBAGO. TRINIDAD:** La Vache Point (E of La Vache Bay), NE of Maraval, 15.x.1963, *H.A. Imshaug & F. Imshaug 32020* (NY).

***Leucodecton compunctellum* (Nyl.) Frisch – PANAMA. PANAMA CANAL ZONE:** Barro Colorado Island, 12.x22.xii.1940, *G.T. Johnston s.n.* (NY). **BAHAMAS. GREAT BAHAMA:** near Eight Mile Rocks, 16.iv-8.v.1905, *L. Brace 3722* (NY). **JAMAICA. PORTLAND PARISH:** Blue Hole, sea level, on bark of *Pisonia subcordata*; 19.ix.1973, *G.R. Proctor 33531* (NY). **CUBA. ISLE OF PINES:** Rocky Point, Ensenada de Siguanea; on dead bark. 13.iii.1916, *N.L. Britton & P. Wilson 15414* (NY). **PUERTO RICO. MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21887* (NY). **MONA ISLAND:** Sardinera, on dead wood, 20-26.ii.1914, *N.L. Britton et al. 1807* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** Andrew's Trace, Arima Valley, 300 m, 26.vi.1960, *H. Fleming & M. Fleming s.n.* (NY).

***Leucodecton fissurinum* (Hale) Frisch – DOMINICAN REPUBLIC. LA VEGA:** La Laguna, along trail up Pico Duarte, 19°02′N, 70°55′W, 1940 m, humid hardwood forest, 13.i.1987, *R.C. Harris 19848* (NY). **MONTE CRISTI:** El Morro de Monte Cristi, 19°54′N, 71°39′W, 237 m, limestone mesa by sea, dry on leeward slope, moist on summit and windward slope, 8.i.1987, *W.R. Buck 13934* (NY).

***Leucodecton glaucescens* (Nyl.) Frisch – BELIZE.** Single Hill Creek, Manatee River limestone hill, 2.i.1931, *H.H. Bartlett 11333* (NY). **BAHAMAS.** Andros, Road to Conch Sound, 12.iii.1907, *L. Brace 6788* (NY). **JAMAICA. ST. ANDREW PARISH:** Bloxburgh Bridge, 950 m, 3.iii.1953, *H.A. Imshaug 15059* (NY). **DOMINICAN REPUBLIC. ALTAGRACIA:** 5.5 km S of La Romana-Higuey Hwy on road to Bayahibe, 18°24′N, 68°50′W, sea level, dry forest over karst limestone, 22.i.1991, *R.C. Harris 26555* (NY). **PEDERNALES:** Las Abejas, S slope of Sierra de Baoruco, 40 km N of Cabo Rojo, 18°12′N, 71°36′W, 1750 m, humid hardwood-*Podocarpus* forest with extensive limestone outcrops, 26.i.1987, *R.C. Harris 20787* (NY); Las Abejas, 40 km along road from Cabo Rojo from junction of road from Oviedo to Pedernales, 18°09′S, 71°36′W, 1190 m, very humid broad-leaf forest with limestone, 13.iii.1981, *W.R. Buck 4360* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** Simla, Arima Valley, 1.iii.1957, *H. Fleming s.n.* (NY), 1.iv.1957, *H. Fleming s.n.* (NY). **BRAZIL. PARÁ:** 23 km upstream from Lageira airstrip, in Rio Maicuru opposite Mutum stream, 00°55′N, 54°26′W, small islands of pinkish granite-like rock, 31.vii.1981, *J.J. Strudwick & G.L. Sobel 3833* (NY). **RORAIMA:** Rio Uraricoera, Canal Maracá, Cachoeira Menori, 61°55'W, on shaded and humid trunk, 24.iii.1979, *J.M. Pires et al. 16787* (NY).

***Leucodecton occultum* (Eschw.) Frisch – (FIGURE 11B). BAHAMAS. NEW PROVIDENCE:** unknown locality, 10.ii.1919, *L. Brace 10033* (NY). **JAMAICA. ST. ANDREW PARISH:** Hope River below August Town, 120 m, 11.xii.1952, *H.A. Imshaug 13642* (NY). **CUBA. ORIENTE:** near railroad station, Noraliche, Guantanamo, 27.ii.1920, *Bro. Hioram 18086* (NY). **SANTA CLARA:** Río San Juán, on *Euphorbia*, 24–25.iii.1910, *N.L. Britton et al. 5876* (NY). **PUERTO RICO.** Playa Sucia Bay, on *Cassia polyphylla*, 1.iii.1915, *N.L. Britton et al. 4782* (NY); Yauco, exposed hill, on bark, 30.xii.1915, *B. Fink 1548* (NY); Coamo Springs, 2.iv.1931, *N.L. Britton & E.G.*

Britton 9741 (NY), on bark, 2.iv.1931, *N.L. Britton & E.G. Britton 9742* (NY), on *Clusia rosea*, 2.iv.1931, *N.L. Britton & E.G. Britton 9745* (NY). **VIRGIN ISLANDS. ST. THOMAS:** W end of island, at Bordeaux, along road leading to shore W of Stumpy Point, mature dry forest and abandoned plantation, on mango, 20.ii.1981, *W.R. Buck 3384* (NY). **VENEZUELA. LARA:** Serranía de Matatere, between Los Caimitos (towards Matatere) and Aguada Grande, 800 m, corticolous, 21.vii.1979, *M. López Figueiras & R. Smith 20975* (NY).

***Leucodecton oxysporum* (Redinger) Lücking – (FIGURE 11C). BRAZIL. MATO GROSSO:** Municipality of Sinop, along BR 80, 115 km E of junction with BR 163, 10°33′S, 53°57′W, Igarapé forest, on limb of fallen tree, 5.x.1985, *W.W. Thomas 4242* (NY).

***Leucodecton sordidescens* (Fée) Lücking & Sipman – (FIGURE 11D). BAHAMAS. ABACO:** unknown locality, 2.i.1905, *L. Brace 2023* (NY). **Andros:** road to Morgan's Bluff, 4.iii.1907, *L. Brace 6699a* (NY); road to Conch Sound, 12.iii.1907, *L. Brace 6806* (NY). **PITCAIRN ISLAND.** unknown locality, 1.i.1957, *R. Lintott 1135* (NY). **GRAND CAYMAN.** E end of island, N of East End Village, Frangipangi trees over ironshore, 13.vii.1959, *H.A. Imshaug 24451* (NY). **GRENADINES. BEQUIA:** Cinnamon Garden on hill just E of Port Elizabeth, 9.ix.1963, *H.A. Imshaug & F. Imshaug 31002* (NY). **DOMINICAN REPUBLIC. ALTAGRACIA:** 5.5 km S of La Romana-Higuey Hwy on road to Bayahibe, 18°24′N, 68°50′W, sea level, dry forest over karst limestone, on *Pilocereus*, 22.i.1991, *R.C. Harris 26558* (NY). **MONTE CRISTI:** El Morro de Monte Cristi, 19°54′N, 71°39′W, 237 m, limestone mesa by sea, dry on leeward slope, moist on summit and windward slope, 8.i.1987, *R.C. Harris 19509* (NY), *W.R. Buck 13937* (NY). **PUERTO PLATA:** Altos de Cofresi, 5 km SE of Puerto Plata on road to Santiago, 19°45′N, 70°37′W, 65 m, dry forest over serpentine, 20.i.1991, *R.C. Harris 26410* (NY); 4.5 km S of Sosúa-Puerto Plata Hwy at Sosúa just W of Río Sosúa, near source of Río Sosúa, 19°41′N, 70°31′W, moist primary forest near sea level, 24.i.1991, *R.C. Harris 26777* (NY).

***Leucodecton subcompunctum* (Nyl.) Frisch – (FIGURE 11E). BELIZE. CAYO:** Southern Maya Mountains near helicopter pad, vicinity of Doyle's Delight, 16°29′N, 89°02′W, 1000 m, forest, slopes of ridge and narrow stream valley, 12.xii.1993, *B.H. Allen 15465B* (NY). **HONDURAS. COMAYAGUA:** from Agua Amarilla to San José de los Planes, 11–15 km of Lake Yojoa, 14°47′N, 87°51′W, 1300–1700 m, at base of standing stump, 14.iii.1993, *B.H. Allen 13986* (NY). **BRAZIL. AMAZONAS:** along Igarapé Caititu, off Rio Uatumã, 01°45′S, 59°45′W, Varzea (periodically flooded, white-sand forest), on tree trunk, 20.viii.1979, *W.R. Buck 3014* (NY).

***Melanotrema platystomum* (Mont.) Frisch – (FIGURE 11F). CUBA.** unknown locality, *J.H. Hart 80* (NY; as *Ocellularia concolor* Meyen & Flot.). **BRAZIL. BAHIA:** Municipio of Ilheus, CEPEC (Centro de Pesquisas do Cacao), km 22 on BR 415 between Ilheus and Itabuna, in Parque Zoobotânico, 14°50′S, 39°13′W, 50 m, southern Bahia hygrophilous forest, overgrown cacao plantation, 15.vii.1991, *D. Vital & W.R. Buck 20130* (NY; as *O. concolor*). **RORAIMA:** 6th BEC-Jundia camp on the Manaus-Caracarai Road at point 328 km from the intersection of the Manaus-Itacoatiara Road, on living log, 16.xi.1977, *K. Dumont et al. 358* (NY; as *O. concolor*).

***Myriotrema clandestinum* (Fée) Hale – JAMAICA.** unknown locality, without date, *J.H. Hart 35* (NY); ii-iii.1905, *C.E. Cummings 94* (NY), *C.E. Cummings 96* (NY). **PUERTO RICO.** Indiera Fria, near Maricao, 430–800 m, 19–22.ii.1915, *N.L. Britton et al.* 4433 (NY).

***Myriotrema congestum* (Hale) Hale – (FIGURE 12A). GUYANA. UPPER DEMERARA:** Mabura Hill and vicinity, 05°25′N, 58°40′W, 50 m, forest on bauxitic sands, with greenheart (*Ocotea rodiaei*) and Kakaralli (*Lecythis* sp.), numerous lianas on lower tree trunk, 19.xi.1986, *J. Pipoly & R. Boyan 8891* (NY).

***Myriotrema glauculum* (Nyl.) Hale. (FIGURE 12B). TRINIDAD AND TOBAGO. TRINIDAD:** Arima, 1957–1958, *H. Fleming s.n.* (NY). **BRAZIL. BAHIA:** Municipality of Entre Rios, road W of Subaúma, 2–5 km W of Subaúma, disturbed vegetation on white sand, on bark, shade, 28.v.1981, *B. Boom & S. Mori 995* (NY). **MATO GROSSO:** Municipality of Sinop, along BR 80, 115 km E of junction with BR 163, 10°33′S, 53°57′W, Igarapé forest, on bark of large tree, 5.x.1985, *W. Thomas 4239* (NY). **RORAIMA:** 6th BEC-Jundia camp on the Manaus-Caracarai Road at point 328 km from the intersection of the Manaus-Itacoatiara Road, on living log, 16.xi.1977, *K. Dumont et al. 330* (NY).

***Myriotrema microporellum* (Nyl.) Hale – JAMAICA.** unknown locality, ii-iii.1905, *C.E. Cummings 104* (NY). **DOMINICAN REPUBLIC. PEDERNALES:** Las Abejas, 40 km along road from Cabo

Rojo from junction of road from Oviedo to Pedernales, 18°09′S, 71°36′W, 1190 m, very humid broad-leaf forest with limestone, 13.iii.1981, *W.R. Buck 4413* (NY).

Myriotrema microporum **(Mont.) Hale – (FIGURE 12D). VENEZUELA. AMAZONAS:** Cerro Huachamacari, Río Cunucunuma cumbre, Caño de Dios, 1800 m, 16.xii.1950, *B. Maguire et al. 30273* (NY). **BRAZIL. AMAZONAS:** along Igarapé Caititu, off Rio Uatumã at Antônio Filinto (old rosewood factory), 01°45′S, 59°40′W, campina, 18–19.viii.1979, *W.R. Buck 2978* (NY).

Myriotrema myrioporoides **(Müll. Arg.) Hale – (FIGURE 12E). VENEZUELA. AMAZONAS:** Río Guainia, just E of Maroa, 100–140 m, forest on living tree trunk, 5.vii.1959, *J. Wurdack & Adderley 43327* (NY). **GUYANA. UPPER DEMERARA:** Mabura Hill and vicinity, 05°25′N, 58°40′W, 50 m, forest on bauxitic sands, with greenheart (*Ocotea rodiaei*) and Kakaralli (*Lecythis* sp.), numerous lianas, on rotten wood., 19.xi.1986, *J. Pipoly & R. Boyan 8879* (NY), on lower tree trunk, 19.xi.1986, *J. Pipoly & R. Boyan 8907* (NY); Mabura Hill timber concession, 05°25′N, 58°40′W, 50 m, ridgetop ecotone between Kakaralli-Wallaba and Purpleheart-Morabukea forest, white sand and brown loamy sand bauxite mosaic, on *Eperua*, 20.xi.1986, *J. Pipoly & R. Boyan 9000* (NY), on fallen tree, 20.xi.1986, *J. Pipoly & R. Boyan 9007* (NY). **DEMERARA-MAHAICA:** along Linden-Soesdyke Hwy, 16 mi S of Georgetown, W of Swan Settlement, 06°20′N, 58°15′W, 0–50 m, savannas on Guayana sandstone, white sand, varying degrees of disturbance, corticolous, 7.xii.1986, *J. Pipoly et al. 9214* (NY).

Myriotrema myrioporum **(Nyl.) Hale – (FIGURE 12F). BELIZE. CAYO:** Southern Maya Mountains, near ridge top camp in vicinity of Doyle's Delight, 16°30′N, 89°03′W, 1098 m, forest along ridge, 8.xii.1993, *B.H. Allen 15254* (NY). **DOMINICAN REPUBLIC. EL SEIBO:** 25 km N of El Seibo on road to Miches, 18 km S of Miches, 18°55′N, 69°09′W, 450 m, cloud forest in ravine and scattered trees in pasture, 23.i.1991, *R.C. Harris 26702* (NY). **BRAZIL. AMAZONAS:** along Igarapé Caititu, off Rio Uatumã at Antônio Filinto (old rosewood factory), 01°45′S, 59°40′W, campina, 18–19.viii.1979, *W.R. Buck 2941* (NY).

Myriotrema neofrondosum **Sipman. (FIGURE 13A). PUERTO RICO. PONCE:** Cordillera Central, above Villalba, Doña Juana Recreation Area, 800–1000 m, wet broadleaf-palm forest on leeward slope, 2.vi.1988, *R.C. Harris 21985* (NY), *R.C. Harris 21995* (NY), *R.C. Harris 22031* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** 10 Mile Trace, Arima Road, lower montane forest, 1.i.1958, *H. Fleming s.n.* (NY; as *M. microporellum*).

Myriotrema olivaceum **(Fée) Müll. Arg. (FIGURE 13B–C). JAMAICA. PARISH OF PORTLAND:** Blue Mountains, Moodies Gap Trail near Hardwar Gap, 1160 m, 14.x.1952, *H.A. Imshaug 13075* (NY). **PUERTO RICO.** El Yunque, 900 m, on bark, 8.xii.1915, *B. Fink 729* (NY; isotype of *Thelotrema subcrassulum* Vain.). **FEDERATION OF ST. KITTS AND NEVIS. NEVIS. ST. GEORGE GINGERLAND PARISH:** trail from above Golden Rock Estate to The Source, 17°09′S, 62°34′W, 350–510 m, humid lower montane forest, 7 .ii.1996, *W.R. Buck 29585* (NY), *R.C. Harris 37958* (NY). **ST. PAUL CAPESTERRE PARISH AND ST. THOMAS MIDDLE ISLAND PARISH:** St. Kitts, Mount Liamuiga Crater Trail from Belmont Estate to rim of crater, 17°22′N, 62°48′W, 350–900 m, moist forest (below) to elfin cloud forest (above), 5.ii.1996, *R.C. Harris 37911* (NY). **ST. LUCIA. QUARTER OF SUFRIÈRE:** Mt. Tabac ridge, 670–730 m, montane thicket, 28.vii.1963, *H.A. Imshaug & F. Imshaug 30296* (NY).

Myriotrema parvidiscum **Sipman – (FIGURE 13D). GUYANA. UPPER DEMERARA:** Mabura Hill and vicinity, 05°25′N, 58°40′W, 50 m, forest on bauxitic sands, with greenheart (*Ocotea rodiaei*) and Kakaralli (*Lecythis* sp.), numerous lianas, on rotten wood, 19.xi.1986, *J. Pipoly & R. Boyan 8875* (NY); Mabura Hill timber concession, 05°25′N, 58°40′W, 50 m, ridgetop ecotone between Kakaralli-Wallaba and Purpleheart-Morabukea forest, white sand and brown loamy sand bauxite mosaic, on *Eperua*, 20.xi.1986, *J. Pipoly & R. Boyan 8995* (NY).

Myriotrema* cf. *polytretum **Hale – (FIGURE 12C). PUERTO RICO.** Caribbean National Forest, Luquillo Division, El Yunque Recreation Area, Big Tree Trial to La Mina Falls, 500 m, moist forest, 5 .iii.1981, *W.R. Buck 4083* (NY; as *M. microporellum*).

Myriotrema viridialbum **(Kremp.) Hale. (FIGURE 13E–F). BOLIVIA. BENI:** vicinity of Guayaramerín, dense, mature forest on sandy soil, gentle slope to a swampy stream, bottom 1.5 m on large tree, 24–25.i.1978, *W.R. Buck 12787* (NY; as *M. myrioporoides*). **BRAZIL. BAHIA:** Municipio of Ilheus, 6 km SW of Olivencia on road to Maruim, 15°00′S, 39°04′W, 100 m, restinga and restinga alta vegetation, 16.vi.1991, *D. Vital & W.R. Buck 20233* (NY; as *M. myrioporoides*).

Nadvornikia hawaiiensis **(Tuck.) Tibell – CUBA. ORIENTE:** Santa Fé, 1.ix.1921, *Bro. Hioram 6904* (NY), 16.iii.1922, *Bro. Hioram s.n.* (NY).

Ocellularia auberianoides **(Nyl.) Müll. Arg – CUBA. CAMAGUEY:** Cubitos Mountains, midway between Camaguey and La Gloria, 19–21.ii.1941, *G.T. Johnston s.n.* (NY; as *O. perforata*).

Ocellularia bahiana **(Ach.) Frisch. (FIGURE 14A–B). BELIZE. CAYO:** near Las Cuevas Field Station, along logging road to San Pastor Camp, 16°44′N, 88°59′W, 560 m, woods, 8.xii.1996, *B.H. Allen 18148* (NY). **COSTA RICA. SAN JOSÉ:** vicinity of El General, 850 m, by river, on tree, 1.i.1936, *A.F. Skutch 2394* (NY). **PANAMA. CHIRIQUÍ:** Santa Clara region, 27 km NW of El Hato del Volcán, coffee finca of Rattibor Hartman called Ojo de Agua, 1500–1600 m, corticolous, 18.vii.1975, *S. Mori & Bolten 7159* (NY). **BAHAMAS. NEW PROVIDENCE:** Soldiers Road, 30.i.1905, *N.L. Britton 3178* (NY). **ST. ANN PARISH:** 1.4 mi W of Discovery Bay, vicinity of Discovery Bay, Marine Laboratory, 18°28' N, 77°25′W, sea level, dry forest over very rough limestone by sea, base of tree, 23.iv.1981, *W.R. Buck 6015* (NY). **JAMAICA. WESTMORELAND PARISH:** NE of Negril at milepost 23, sea level, 15.i.1975, *G.R. Proctor 34695* (NY). **CUBA. ORIENTE:** Confianza Estate, 4.iii.1922, *Bro. Hioram 5791* (NY). **ISLE OF PINES:** base of Sierra de las Casas, on tree, 5.v.1910, *O.E. Jennings 41* (NY). **DOMINICAN REPUBLIC. DISTRITO NACIONAL:** Sierra Prieta, 18 km NW of Villa Mella on road to Yamasá, 18°39′N, 69°58′W, 250 m, original scrub forest on mesic serpentine hill, 18.i.1987, *R.C. Harris 20169* (NY). **PEDERNALES:** Las Abejas, S slope of Sierra de Baoruco, 40 km N of Cabo Rojo, 18°12′N, 71°36′W, 1750 m, humid hardwood-*Podocarpus* forest with extensive limestone outcrops, 26.i.1987, *R.C. Harris 20762* (NY), *R.C. Harris 20767* (NY). **FRENCH GUIANA. SAÜL:** Monts La Fumée, 03°37′N, 53°12′W, 200–400 m, tropical moist forest, bark, on dead log, 1.ix.1982, *B. Boom & S. Mori 1580* (NY). **VENEZUELA. BOLIVAR:** km 203–204 S of El Dorado, on road between El Dorado and Sta. Elena, on unidentified tree, 7.viii.1972, *K. Dumont et al. 7291* (NY). **BRAZIL. BAHIA:** Municipality of Itanagra, road from Itanagra to Subaúma, 8 km W of Itanagra, 50 m, slightly disturbed primary forest on bark, full shade, 26.v.1981, *B. Boom & S. Mori 929* (NY).

Ocellularia barroensis **Hale – ECUADOR. PICHINCHA:** 18 km NW of San Miguel de los Bancos, forest reserve of ENDESA along path through middle of reserve, 00°05′N, 78°55′W, 800 m, wet, virgin forest, 27–29.xii.1983, *R.C. Harris 17891* (NY). **GUYANA.** NW portion of Kanuku Mountains, Mount Iramaikpang, dense forest, 22–23.iv.1938, *A.C. Smith 3664a* (NY). **BRAZIL. BAHIA:** Municipio Uruçuca, 6.2 km N of town of Serra Grande, 40 km N of Ilheus along coast, 14°26′S, 39°03′W, 200 m, tropical forest with small stream in ravine, 11.vii.1991, *D. Vital & W.R. Buck 20266* (NY).

Ocellularia carassensis **(Hale) Sipman – BRAZIL. SÃO PAULO:** Praia de Peruibe near Itanhaém, 1 m, mangrove, on *Rhizophora*, 23.ix.1978, *K. Kalb & G. Plöbst s.n.* (NY).

Ocellularia cavata **(Ach.) Müll. Arg – BELIZE. CAYO:** Southern Maya Mountains, near ridge top camp in vicinity of Doyle's Delight, 16°30′N, 89°03′W, 1098 m, forest along ridge, 8.xii.1993, *B.H. Allen 15246* (NY). **GRENADA. PARISH OF ST. GEORGE:** near shore of Grand Etang, 470 m, montane rain forest, 6.vii.1953, *H.A. Imshaug 16095* (NY). **CUBA. ORIENTE:** La Prenda, 1.i.1923, *Bro. Hioram 6783* (NY). **SANTIAGO DE CUBA:** La Gran Piedra SE of peak, 1000 m, humid secondary forest, 2.iv.1982, *R.C. Harris 14218* (NY); Monte Kentucky, 5 km SE of La Gran Piedra along trail, 1000 m, pine woods and moist hardwoods, 5.iv.1982, *R.C. Harris 14439* (NY). **DOMINICAN REPUBLIC. LA VEGA:** La Sal, 13.3 km N of El Río, then 10 km E of Paso Bajito, on road to Casabito, 1060–1100 m, humid hardwoods along stream, 29.iv.1982, *R.C. Harris 14998* (NY). **PUERTO RICO. MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21869* (NY); Maricao State Forest just NW of Universidad Católica Estación Biológica, along Hwy 120 at km 15.8, 600 m, forest on slope with many tree ferns and palms, 5.vi.1988, *R.C. Harris 22321* (NY), *R.C. Harris 22326* (NY). **PONCE:** Cordillera Central, above Villalba, Doña Juana Recreation Area, 800–1000 m, wet broadleaf-palm forest on leeward slope, 2.vi.1988, *R.C. Harris 21979C* (NY). **COLOMBIA. ANTIOQUIA:** Chaquire, 1 km off the Medellín-Uramal Road, 83 km from Medellín, 2800 m, oak forest, 17.viii.1976, *K. Dumont et al. 6585* (NY). **BOLIVIA. LA PAZ:** Tumupasa, 1.i.1902, *R.S. Williams 2327* (NY). **BRAZIL. AMAZONAS:** Ilha Acarabu, at mouth of Rio Marie, 00°25′S, 66°25′W, marshy forest, 4.vii.1979, *R.M. Schuster 79-11-309A* (NY); along W shore of Rio

Uatumã at junction of Rio Pitinga, 01°31′N, 59°50′W, primary forest on small tree trunk, 24–27.viii.1979, *W.R. Buck 3190* (NY); along Igarapé Caititu, off Rio Uatumã, 01°45′S, 59°45′W, Varzea (periodically flooded, white-sand forest), on palm roots, 20.viii.1979, *W.R. Buck 3003* (NY).

Ocellularia crocea **(Kremp.) Overeem & D. Overeem – (FIGURE 14C). ECUADOR. PICHINCHA:** 18 km NW of San Miguel de los Bancos, forest reserve of ENDESA, 00°05′N, 78°55′W, 800 m, wet, virgin forest on felled tree, 27–29.xii.1983, *R.C. Harris 17835* (NY). **BRAZIL. AMAZONAS:** Igarape do Taruma, Grande Igapo, 8.xi.1977, *D.R. Hosford et al. 192* (NY; as *Ocellularia* cf. *punctulata*).

Ocellularia domingensis **(Fée) Müll. Arg. – (FIGURE 14D). BELIZE. CAYO:** Southern Maya Mountains near helicopter pad, vicinity of Doyle's Delight, 16°29′N, 89°02′W, 1000 m, forest, slopes of ridge and narrow stream valley, 12.xii.*1993, B.H. Allen 15465A* (NY).

Ocellularia fecunda **(Vain.) Hale – (FIGURE 14E). PANAMA. PANAMA:** along road 11 km N of Cerro Azul, corticolous, 6.iii.1975, *S. Mori & J. Kallunki 4930* (NY); 5–10 km NE of Altos de Pacora, 750 m, premontane rain forest, high on bole of 15 m tall *Dendropanax*, 8.iii.1975, *S. Mori & J. Kallunki 4996* (NY), *S. Mori & J. Kallunki 4997* (NY). **GUADELOUPE.** Houelmond; on old *Coccoloba diversifolia*, 1915, *P.A. Duss 1316* (NY).

Ocellularia gracilis **Müll. Arg. – BELIZE. CAYO:** Southern Maya Mountains near helicopter pad, vicinity of Doyle's Delight, 16°29′N, 89°02′W, 1000 m, forest, slopes of ridge and narrow stream valley, 12.xii.1993, *B.H. Allen 15467* (NY).

Ocellularia interposita **(Nyl.) Hale – JAMAICA. PARISH OF ST. CATHERINE:** Mount Diablo, 790 m, seasonal forest, 18.xii.1952, *H.A. Imshaug 13778* (NY). **ST. LUCIA. QUARTER OF SUFRIÈRE:** Des Bottes, NE of Sufrière, 610 m, secondary rain forest, 20.vii.1963, *H.A. Imshaug & F. Imshaug 30088* (NY).

Ocellularia kanneliyensis **Hale** – Malaysia. Labuan, Borneo: Tanjong Kulong; on rugged and decaying bark of large dammar tree, *Motley 3* (NY).

Ocellularia laeviuscula **(Nyl.) Kraichak, Lücking & Lumbsch – DOMINICAN REPUBLIC. SAMANÁ:** Hacienda Nydia, 3.5 km E of Las Terrenas and 4 km S of beach, 120 m, moist, densely shaded forest with limestone outcrops, 18.v.1982, *R.C. Harris 16243* (NY).

Ocellularia maxima **(Hale) Lumbsch & Mangold – (FIGURE 14F). CUBA. SANTIAGO DE CUBA:** 1–2 km W of La Gran Piedra, 1000 m, roadside and *Juniperus* forest, 5.iv.1982, *W.R. Buck 7716* (NY).

Ocellularia obturascens **(Nyl.) Hale – (FIGURE 15A). DOMINICAN REPUBLIC. ALTAGRACIA:** 4 km N of Bayahibe, 18°25′N, 68°50′W, dry forest with cacti on dead branch, 30.iii.1981, *W.R. Buck 5142* (NY). **GUADELOUPE.** Gombeyre, 1898, *P.A. Duss 1029* (NY); Camp Jacob, Gombeyre, 1897, *P.A. Duss 152* (NY)

Ocellularia polydiscus **Redinger – (FIGURE 15B–C). BRAZIL. MATO GROSSO:** 35 km SE of Cuiaba,120 m, light Cerradão, 4.vii.1980, *K. Kalb s.n.* (NY).

Ocellularia postposita **(Nyl.) Frisch – (FIGURE 15D). DOMINICAN REPUBLIC. LA VEGA:** vicinity of pyramids, 13.8 km S of Valle Nuevo, 44.7 km S of Constanza, 2250 m, moist pine forest with shrubs and bunch grass fields, 30.iv.1982, *R.C. Harris 15046* (NY).

Ocellularia praestans **(Müll. Arg.) Hale – (FIGURE 15E). CUBA. SANTIAGO DE CUBA:** La Gran Piedra, 1.5 km SE of peak, 1000 m, moist, shady primary(?) forest on slope, 3.iv.1982, *R.C. Harris 14262* (NY), *R.C. Harris 14269* (NY), *R.C. Harris 14273* (NY), *R.C. Harris 14281* (NY), *R.C. Harris 14292* (NY), *R.C. Harris 14296* (NY), *R.C. Harris 14373* (NY); 1.5 km SE of peak in small stream valley just NW of commercial flower garden, 1000 m, moist, shady hardwoods with pines above, 6.iv.1982, *R.C. Harris 14519* (NY), *R.C. Harris 14522* (NY), *R.C. Harris 14531* (NY), *R.C. Harris 14532* (NY), *R.C. Harris 14557* (NY); along road below peak and new road NE of peak, 1000 m, moist, semi-shady hardwoods, 6.iv.1982, *R.C. Harris 14568* (NY). **PUERTO RICO.** N side of Luquillo Mountains, tree trunk, 14.iv.1899, *A.A. Heller 1095* (NY); Mount Morales, near Utuado, upper slopes, 19.iii.1906, *M.A. Howe 1164* (NY). **MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21847* (NY), *R.C. Harris 21868* (NY), *R.C. Harris 21876* (NY), *R.C. Harris 21894* (NY), *R.C. Harris 21907* (NY); Cordillera Central, Reserva Forestal Maricao along Hwy 120 at km 13.8, near picnic area, 875 m, mesic forest, 28.ii.1981, *W.R. Buck 3816* (NY). **FEDERATION OF ST. KITTS AND NEVIS. NEVIS.**

ST. GEORGE GINGERLAND PARISH: trail from above Golden Rock Estate to The Source, 17°09'S, 62°34'W, 200 m, humid lower montane forest, 7.ii.1996, *W.R. Buck 29620* (NY).

***Ocellularia protocetrarica* Hale – BRAZIL. AMAZONAS:** along Igarapé Santa Luzia, just off Rio Uatumã, 01°50'N, 59°35'W, open primary forest and varzea, on trunk of small tree, 16–17.viii.1979, *W.R. Buck 2906* (NY); along BR 307, N from São Gabriel da Cachoeira to Cucuí, just N of Igarape Iá-Mirim, near Jerusalém, 00°20'N, 66°35'W, primary forest, on tree trunk, 17.vii.1979, *W.R. Buck 2580* (NY), *W.R. Buck 2581* (NY). – This species is here reinstated as taxonomically distinct from *Ocellularia mauretiana* Hale, which has larger ascomata that become sessile and have an irregular margin (**FIGURE 15F**).

***Ocellularia punctulata* (Leight.) Zahlbr. – PUERTO RICO. MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21912B* (NY).

***Ocellularia pyrenuloides* Zahlbr. ex H. Magn. – PUERTO RICO. PONCE:** Cordillera Central, Caribbean National Forest, Toro Negro Division along Hwy 143 at km 20, 1000–1200 m, lower montane wet broad-leaf-palm-tree fern forest on windward slope, 2.vi.1988, *R.C. Harris 22038* (NY).

***Ocellularia rhabdospora* (Nyl.) Redinger. – (FIGURE 16A). CUBA. SANTIAGO DE CUBA:** La Gran Piedra, 1.5 km SE of peak, 1000 m, moist, shady primary(?) forest on slope, 3.iv.1982, *R.C. Harris 14284* (NY); La Gran Piedra, NE slope of mountain, 1100 m, semi-moist hardwood forest, 7.iv.1982, *R.C. Harris 14660* (NY). **DOMINICAN REPUBLIC. LA VEGA:** km 17 on Jarabacoa-La Vega road, forest of rose apple (*Syzygium jambos*), 11.v.1982, *R.C. Harris 15749* (NY; as *Ocellularia cavata*). **MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21870* (NY), *R.C. Harris 21880* (NY).

***Ocellularia rhodostroma* (Mont.) Zahlbr. – (FIGURE 16B). PANAMA. PANAMA:** along road 11 km N of Cerro Azul, corticolous, 6.iii.1975, *S. Mori & J. Kallunki 4929* (NY). **VERAGUAS:** NW of Santa Fe, 1.8 km from Escuela Agrícola Alto de Piedra, on bole, 23.ii.1975, *S. Mori & J. Kallunki 4771* (NY). **JAMAICA.** unknown locality; ii-iii.1905, *C.E. Cummings 105* (NY). **GUADELOUPE.** Bois inférieurs des Bains-Jaunes, on *Inga laurina*, 1898, *P.A. Duss 1031a* (NY). **ST. LUCIA. QUARTER OF ANSE-LA-RAYE:** Mt. Gimie, 670–950 m, elfin woodland, 10.vii.1963, *H.A. Imshaug 29856* (NY). **FEDERATION OF ST. KITTS AND NEVIS. ST. PAUL CAPESTERRE PARISH AND ST. THOMAS MIDDLE ISLAND PARISH:** St. Kitts, Mount Liamuiga Crater Trail from Belmont Estate to rim of crater, 17°22'N, 62°48'W, 350–900 m, moist forest (below) to elfin cloud forest (above), 5.ii.1996, *R.C. Harris 37887* (NY), *R.C. Harris 37893* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** ridge from Lalaja-Paria Road to El Cerro del Aripo, NE of Arima, northern range forested area, 20.x.1963, *H.A. Imshaug 32214* (NY); Guayaguayare, on *Mora*, 20.v.1957, *H. Fleming s.n.* (NY); 10 Mile Trace, Arima Road, lower montane forest, 1.i.1958, *H. Fleming s.n.* (NY).

***Ocellularia rubropolydiscus* M. Cáceres, Aptroot & Lücking – BOLIVIA. LA PAZ:** Tumupasa; 1.i.1902, *R.S. Williams s.n.* (NY; as *Ocellularia rhabdospora*).

***Ocellularia sanfordiana* Zahlbr. – (FIGURE 16E). CUBA. SANTIAGO DE CUBA:** La Gran Piedra, 1.5 km SE of peak, 1000 m, moist, shady primary(?) forest on slope, 3.iv.1982, *R.C. Harris 14264* (NY); La Gran Piedra, NE slope of mountain, 1100 m, semi-moist hardwood forest 7.iv.1982, *R.C. Harris 14635* (NY). **PUERTO RICO.** Cordillera Central, Reserva Forestal Maricao along Hwy 120 at km 13.8, near picnic area, 875 m, mesic forest, 28.ii.1981, *W.R. Buck 3799A* (NY), *W.R. Buck 3820* (NY; as *Ocellularia depressa* Müll. Arg.); Maricao to Monte Alegrillo, 500–900 m, 3.iv.1913, *N.L. Britton 2658* (NY; as *O. depressa*). **MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8; 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21888* (NY), *R.C. Harris 21906* (NY; as *O. depressa*); Maricao State Forest just NW of Universidad Católica Estación Biológica, along Hwy 120 at km 15.8; 600 m; forest on slope with many tree ferns and palms, 5.vi.1988, *R.C. Harris 22328* (NY), *R.C. Harris 22329* (NY; as *O. depressa*); Maricao State Forest just NE of Universidad Católica Estación Biológica, along Hwy 120 at km 15.8, along trail on hill top around towers, 700 m, semi-dry forest and open area, 5.vi.1988, *R.C. Harris 22306* (NY; as *O. depressa*). **PONCE:** Cordillera Central, above Villalba, Doña Juana Recreation Area, 800–1000 m, wet broadleaf-palm forest on leeward slope, 2.vi.1988, *R.C. Harris 22012* (NY; as *O. depressa*).

***Ocellularia subcarassensis* Sipman & Lücking – PANAMA. VERAGUAS:** NW of Santa Fe 1 km from Escuela Agrícola Alto de Piedra, on base of tree, 24.ii.1975, *S. Mori & J. Kallunki 4808* (NY; as *Myriotrema concretum* (Fée) Hale).

***Ocellularia* aff. *subcarassensis* Sipman & Lücking – PUERTO RICO. PONCE:** Cordillera Central, above Villalba, Doña Juana Recreation Area, 800–1000 m, wet broadleaf-palm forest on leeward slope, 2.vi.1988, *R.C. Harris 21979A* (NY).

***Ocellularia subperforata* Nagarkar, Sethy & Patw. – (FIGURE 16F). DOMINICAN REPUBLIC. EL SEIBO:** 7 km S of Sabana de la Mar on road from El Valle, 18°55′N, 69°22′W, cacao plantation on cacao, 28.iii.1981, *W.R. Buck 4994* (NY). **SAMANÁ:** base of Loma de Pan de Azucar, near La Laguna and Río San Juán, sea level, pastures with hedgerows, 19.v.1982, *W.R. Buck 8738* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** Arima Valley, Arima-Blanchisseuse road, 7 km N of Arima ridge, above Simla at Verdant Vale, 9.x.1963, *H.A. Imshaug & F. Imshaug 31834* (NY).

***Ocellularia thryptica* Hale – CUBA. LAS VILLAS:** Trinidad Mountains, near Buenos Aires, 750–900 m, 6–10.iii.1941, *G.T. Johnston s.n.* (NY).

***Ocellularia* aff. *thryptica* Hale – CUBA. SANTIAGO DE CUBA:** La Gran Piedra SE of peak, 1000 m, humid secondary forest, 2.iv.1982, *R.C. Harris 14178* (NY; as *O. perforata*).

***Ocellularia triglyphica* (Kremp.) Zahlbr. – PANAMA. PANAMA:** Cerro Campana along trail to top, SW slope from road, 825–1000 m, premontane wet forest, on large tree trunk, 12.v.1974, *M. Nee & H. Stockwell 11594* (NY). **BRAZIL. SÃO PAULO:** Ilha de São Sebastião, 130 km E of São Paulo, western slope of Morro das Tacas, 600 m, very wet rain forest on slope, 21.iv.1978, *K. Kalb & G. Plöbst s.n.* (NY; as *O. melanostoma* (Kremp.) Kalb).

***Ocellularia urceolaris* Ach. – JAMAICA. PARISH OF PORTLAND:** fork of Swift River on E slope between High Peak and Main Ridge Gap, 1520 m, 24.ii.1953, *H.A. Imshaug 14966* (NY).

***Ocellularia vezdana* Frisch – CUBA. SANTIAGO DE CUBA:** La Gran Piedra SE of peak, 1000 m, humid secondary forest, 2.iv.1982, *R.C. Harris 14192* (NY; as *O. perforata*); vicinity of Museo de la Francesca, La Gran Isabelita, 2 km SE of La Gran Piedra, 1000 m, open secondary forest on ridge, 7.iv.1982, *R.C. Harris 14612* (NY; as *O. perforata*).

***Ocellularia violacea* Räsänen – CUBA. SANTIAGO DE CUBA:** La Gran Piedra, 1.5 km SE of peak, 1000 m, moist, shady primary(?) forest on slope, 4.iv.1982, *R.C. Harris 14365* (NY; as *O. perforata*). **DOMINICAN REPUBLIC. PEDERNALES:** Las Abejas, 52 km N of port of Cabo Rojo on Alcoa road, 1160 m, *Podocarpus*-dominated forest, 7.v.1982, *R.C. Harris 15568* (NY).

***Ocellularia* cf. *violacea* Räsänen – DOMINICAN REPUBLIC. INDEPENDENCIA:** Sierra de Baoruco, 23.5 km S of Puerto Escondito at intersection of road to Charco Colorado, 18°16′N, 71°33′W, 1750 m, humid, dense broadleaf forest, 24.i.1987, *R.C. Harris 20476* (NY). **PUERTO PLATA:** 4.5 km S of Sosúa-Puerto Plata Hwy at Sosúa just W of Río Sosúa, near source of Río Sosúa, 19°41′N, 70°31′W, moist primary forest near sea level, 24.i.1991, *W.R. Buck 19332* (NY).

***Ocellularia viridipallens* Müll. Arg. – DOMINICAN REPUBLIC. EL SEIBO:** 19 km E of Sabana de la Mar on road to Miches, 19°00′N, 69°12′W, sea level, cacao plantation by river on cacao 28.iii.1981, *W.R. Buck 4998* (NY; as *O. papillata*). **TRINIDAD AND TOBAGO. TRINIDAD:** Morne Povi Quarry, *H. Fleming s.n.* (NY; as *O. papillata*); ridge from summit of Morne Bleu to Lalaja-Paria trail northern range, between Arima and Blanchisseuse, 11.x.1963, *H.A. Imshaug & F. Imshaug 31873* (NY; as *O. papillata*).

***Ocellularia xanthostromiza* (Nyl.) Zahlbr. – PUERTO RICO. MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21869A-2* (NY). **BRAZIL. AMAZONAS:** slopes and summit of Serra do Chocador, W shore of Rio Uatumã, 01°37′N, 59°40′W, terra firme forest on dead trunk, 22.viii.1979, *W.R. Buck 3065A* (NY; as *O.* cf. *punctulata*); Reserva Biolôgica de Campina INPA-SUFRAMA, on Manaus-Caracarai Road at point 45 km from intersection of Manaus-Itacoatiara Road, on dead log; 6.xi.1977, *K. Dumont et al. 118* (NY; as *O.* cf. *punctulata*).

***Pseudochapsa dilatata* (Kalb) Parnmen, Lücking & Lumbsch – CUBA. ORIENTE:** Sierra Maestra, around summit of El Gato, Loma del Gato, montane thicket, 13.viii.1959, *H.A. Imshaug 24851* (NY). **DOMINICAN REPUBLIC. LA VEGA:** km 17 on Jarabacoa-La Vega road, forest of rose apple (*Syzygium jambos*), 11.v.1982, *R.C. Harris 15752* (NY), *R.C. Harris 15753B* (NY). **PUERTO RICO. CAGUAS:** Carite Forest Reserve, at intersection of Hwys 184 and 179, 900 m, wet submontane forest, 9.vi.1988, *R.C. Harris 22464* (NY). **MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21862B* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** Paria Trace, semi-evergreen forest, on *Ocotea eggersiana*, 14.v.1957, *H. Fleming s.n.* (NY).

***Pycnotrema pycnoporellum* (Nyl.) Rivas Plata & Lücking – CUBA. ORIENTE:** Olimpo Estate, 11.iv.1922, *Bro. Hioram 5930* (NY). **PUERTO RICO. ARECIBO:** Cambalache Forest Reserve, just E of Garrochales, 175 m, mesic forest over limestone in haystack hills, 11.vi.1988, *W.R. Buck 16165* (NY).

***Redingeria microspora* (Zahlbr.) M. Cáceres & Lücking – (FIGURE 17E–F). PANAMA.** Marraganti and vicinity, 0–60 m, 3–9.iv.1908, *R.S. Williams 1103* (NY). **JAMAICA. PARISH OF ST. ANN:** Stewart Town, 240 m, 9.v.1953, *H.A. Imshaug 16015* (NY). **ST. LUCIA. QUARTER OF SUFRIÈRE:** St. Remy, S of Sufrière; 300 m; cultivated area, 16.vii.1963, *H.A. Imshaug & F. Imshaug 29987* (NY). **COLOMBIA. SANTA MARTA:** near Bonda, xii.1898, *C.F. Baker 51* (NY).

***Reimnitzia santensis* (Tuck.) Kalb – PITCAIRN ISLAND.** unknown locality, on rock, 1.i.1957, *R. Lintott 1140* (NY).

***Rhabdodiscus anamorphoides* (Nyl.) Vain. – CUBA. SANTIAGO DE CUBA:** La Gran Piedra, 1.5 km SE of peak, 1000 m, moist, shady primary(?) forest on slope, 3.iv.1982, *R.C. Harris 14260* (NY), *R.C. Harris 14357* (NY), *R.C. Harris 14362* (NY), *R.C. Harris 14377* (NY; as *O. auberiana* (Mont.) Hale); La Gran Piedra, NE slope of mountain, 1100 m, moist hardwood forest, 7.iv.1982, *W.R. Buck 7791* (NY; as *O. auberiana*). **LAS VILLAS:** Trinidad Mountains, near Buenos Aires, 750–900 m, 6–10.iii.1941, *G.T. Johnston s.n.* (NY; as *O. auberiana*). **VENEZUELA. AMAZONAS:** along Río Mawarinuma, just outside Cañon Grande vicinity of Neblina base camp, 00°50′N, 66°10′W, 140 m, low primary forest on white sand, 13.ii.1984, *W.R. Buck 10818* (NY; as *O. auberiana*). **BRAZIL. ACRE:** vicinity of Sena Madureira, 7 km from city near Rio Caeté, 09°05′S, 68°40′W, terra firme forest, 1.x.1980, *B.W. Nelson et al. 497* (NY; as *O. auberiana*). **AMAZONAS:** along Igarapé Caititu, off Rio Uatumã, 01°45′S, 59°45′W, Varzea (periodically flooded, white-sand forest) on sand, 20.viii.1979, *W.R. Buck 3027* (NY; as *O. auberiana*); along Igarapé Caititu, off Rio Uatumã at Antônio Filinto (old rosewood factory), 01°45′S, 59°40′W, campina on trunk of Myristicaceae, 18–19.viii.1979, *W.R. Buck 2953* (NY; as *O. auberiana*). **RORAIMA:** 6th BEC-Jundia camp on the Manaus-Caracarai Road at point 328 km from the intersection of the Manaus-Itacoatiara Road, on living trunk, 16.xi.1977, *K. Dumont et al. 301* (NY; as *O. auberiana*). **SANTA CATARINA:** São Canisio do Porto Novo, 1928, *Rick 395* (NY; as *O. auberiana*). – This species (**FIGURE 18B-C**) is anatomically identical with *R. auberianus* and the two taxa are often considered conspecific, with "*auberianus*" then being the older epithet. However, most specimens can either be assigned to *R. auberianus* (ascomata rounded, with inclined, thick, entire margin surrounding a pore, and entire to lobate columella) or *R. anamorphoides* (ascomata angular, chroodiscoid, with erect to recurved, thin, fissured to lobate margin exposing a broad disc filled with a highly complex columella). The two forms do not seem to represent ontogenetic stages of development but are rather distinctive. Yet, intermediate forms are not rare. This complex is in need of a detailed molecular study.

***Rhabdodiscus auberianus* (Mont.) Vain. – (FIGURE 18A). CUBA.** Alto Cedro; 1.iii.1903, *L.M. Underwood & F.S. Earle 1489* (NY). **SANTIAGO DE CUBA:** La Gran Piedra, 1.5 km SE of peak, 1000 m, moist, shady primary(?) forest on slope, 3.iv.1982, *R.C. Harris 14295* (NY), *R.C. Harris 14361* (NY); La Gran Piedra, along read below peak and new road NE of peak, 1000 m, moist, semi-shady hardwoods, 6.iv.1982, *R.C. Harris 14578* (NY). **BOLIVIA.** Isagnú, 4.x.1901, *R.S. Williams 2311* (NY); near San José, 4.ii.1902, *R.S. Williams 2311a* (NY). **BRAZIL. RORAIMA:** along Manaus-Boa Vista Road (BR 174), at point ca. 350 km from intersection of the Manaus-Itacoatiara Road, on dead fallen branch, 18.xi.1977, *K. Dumont et al. 587* (NY).

***Rhabdodiscus crassus* (Müll. Arg.) Rivas Plata, Lücking & Lumbsch – (FIGURE 18D). CUBA. ORIENTE:** Sierra Maestra, around summit of El Gato, Loma del Gato, montane thicket, 13.viii.1959, *H.A. Imshaug 24874* (NY; as *Leptotrema fissum* (Nyl.) Müll. Arg.). **ST. LUCIA. QUARTER OF SUFRIÈRE:** summit area of Gros Piton, 700–800 m, elfin woodland type modification of semi-evergreen seasonal forest, 24.vii.1963, *H.A. Imshaug & F. Imshaug 30204* (NY; as *L. fissum*).

***Rhabdodiscus inspersus* M. Cáceres, Aptroot & Lücking – VENEZUELA. AMAZONAS:** Río Mawarinuma Neblina base camp, 00°50′N, 66°10′W, 140 m, low silty forest, 25–28.xi.1984, *L.*

Brako 7554 (NY; as *Ocellularia subemersa* Müll. Arg.). **SURINAME. SIPALIWINI:** along road 1.8 km NW of Blanche Marie guest house, 4°45′N, 56°53′W, 90 m, on trunk of tree in tree fall, 12.vi.1997, *R.A. Pursell 11769* (NY; as *O. subemersa*).

***Rhabdodiscus jamaicensis* (Müll. Arg.) Rivas Plata, Lücking & Lumbsch – (FIGURE 18E). JAMAICA.** nnknown locality, ii-iii.1905, *C.E. Cummings 98*, *102* (NY). **PARISH OF ST. ANDREW:** John Crow Peak, 1750 m, 27.iii.1953, *H.A. Imshaug 15354b* (NY).

***Rhabdodiscus* aff. *jamaicensis* (Müll. Arg.) Rivas Plata, Lücking & Lumbsch – CUBA. ORIENTE:** Santa Fé, 16.iii.1922, *Bro. Hioram 5832* (NY; as *Ocellularia auberiana*). **LAS VILLAS:** Trinidad Mountains, near Buenos Aires, 750–900 m, 6–10.iii.1941, *G.T. Johnston s.n.* (NY; as *O. auberiana*).

***Rhabdodiscus latilaber* (Tuck.) Vain. – CUBA. ISLE OF PINES:** Caleta, Cocodrilos, on bark, 8.iii.1916, *N.L. Britton et al. 15280* (NY).

***Rhabdodiscus metaphoricus* (Nyl.) Vain. – DOMINICAN REPUBLIC. PEDERNALES:** Las Abejas, 52 km N of port of Cabo Rojo on Alcoa road, 1160 m, *Podocarpus*-dominated forest, 7.v.1982, *R.C. Harris 15583* (NY).

***Rhabdodiscus subcavatus* (Nyl.) Rivas Plata, Lücking & Lumbsch – JAMAICA. PARISH OF PORTLAND OR ST. ANDREW:** ridge just below summit of Catherine's Peak, 1490 m, 11.xi.1952, *H.A. Imshaug 13387* (NY).

***Rhabdodiscus subemersus* (Müll. Arg.) Rivas Plata, Lücking & Lumbsch – (FIGURE 18F). HONDURAS. CORTES:** Cusuco National Park, from Río Cusuco to summit of Cerro Jilinco, 22 km W of San Pedro Sula, 16 km S of Cuyamel trail along ridge to summit, 15°31′N, 88°44′W, 1600–2242 m, on bark of large tree trunk, 20.iii.1993, *B.H. Allen 14258* (NY). **JAMAICA.** unknown locality, ii-iii.1905, *C.E. Cummings 107* (NY). **VENEZUELA. AMAZONAS:** along Río Mawarinuma, just outside Cañon Grande vicinity of Neblina base camp, 00°50′N, 66°10′W, 140 m, low primary forest on white sand, 27.ii.1984, *W.R. Buck 11214* (NY), 10.iii.1984, *W.R. Buck 11478* (NY); Río Mawarinuma Neblina base camp, 00°50′N, 66°10′W, 140 m, low silty forest, 25–28.xi.1984, *L. Brako 7541* (NY).

***Schizotrema cryptotrema* (Nyl.) Rivas Plata & Mangold – (FIGURE 19A). PANAMA. PANAMA CANAL ZONE:** 1 km N of Miraflores Locks, on *Cochlospermum vitifolium*, 17.iii.1971, *M. Nee & S. Mori 3693* (NY).

***Stegobolus anamorphus* (Nyl.) Frisch – PANAMA. DARIEN:** in valley of El Cupe River along flank of Pirre Massif, 20 km SSW of Boca de Cupe, 07°24′N, 77°37′W, 200–750 m, on tree trunk, 30.iv.1990, *B.H. Allen 8712* (NY; as *Ocellularia auberiana*).

***Stegobolus berkeleyanus* Mont. & Bosch. – VENEZUELA. AMAZONAS:** Río Guainia, just E of Maroa, 100–140 m, forest, 5.vii.1959, *J. Wurdack & L.S. Adderley 43331* (NY). **GUYANA. UPPER DEMERARA:** Mabura Hill and vicinity, 05°25′N, 58°40′W, 50 m, forest on bauxitic sands, with greenheart (*Ocotea rodiaei*) and Kakaralli (*Lecythis* sp.), numerous lianas, on rotten log, 19.xi.1986, *J. Pipoly & R. Boyan 8919* (NY).

***Stegobolus radians* (Müll. Arg.) Frisch – (FIGURE 19B). JAMAICA.** nnknown locality, ii-iii.1905, *C.E. Cummings 131* (NY).

***Stegobolus wrightii* (Tuck.) Frisch – (FIGURE 19C–D). VENEZUELA. AMAZONAS:** Cerro de la Neblina, ridge 1 km SSW of Neblina base camp, 00°50′N, 66°10′W, 200–340 m, primary forest with numerous huge boulders, 6.iii.1984, *W.R. Buck 11394* (NY). **SURINAME. SIPALIWINI:** Kayserberg Airstrip area, river camp up Zuid River (south), 1.5 hours by canoe, 03°00′N, 56°27′W, 230 m, 10–14.vi.2003, *B.H. Allen 25331* (NY). **FRENCH GUIANA. SAÜL:** La Fumée Mountain Trail, La Fumée Quest, 03°37′N, 53°12′W, 250 m, non-flooded moist forest, on tree, 10.vi.1988, *S. Mori & C. Gracie 18863* (NY).

***Thelotrema conveniens* Nyl. – PUERTO RICO. PONCE:** Cordillera Central, Caribbean National Forest, Toro Negro Division along Hwy 143 at km 20, 1000–1200 m, lower montane wet broad-leaf-palm-tree fern forest on windward slope, 2.vi.1988, *R.C. Harris 22045C* (NY).

***Thelotrema lathraeum* Tuck. – PUERTO RICO. MAYAGÜEZ:** Maricao State Forest, La Quinta area, vicinity of Universidad Católica Estación Biológica along Hwy 120 at km 15.8, 600 m, moist, broadleaf forest, 1.vi.1988, *R.C. Harris 21869A-1* (NY).

***Thelotrema leucophthalmum* Nyl. – PUERTO RICO.** Indiera Fria, near Maricao, 430–800 m, 19–22.ii.1915, *N.L. Britton et al. 4501* (NY).

***Thelotrema monosporum* Nyl. – BAHAMAS. NEW PROVIDENCE:** unknown locality; 11.ii.1919, *L. Brace 10051* (NY). **PUERTO RICO. CAGUAS:** Carite Forest Reserve, at intersection of Hwys 184 and 179, 900 m, wet submontane forest, 9.vi.1988, *R.C. Harris 22427* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** Simla, Arima Valley, 1.i.1958, *H. Fleming s.n.* (NY).

***Thelotrema pachysporum* Nyl. – BAHAMAS. NEW PROVIDENCE:** unknown locality; 7.ii.1919, *L. Brace 10000* (NY).

***Thelotrema porinoides* Mont. & Bosch. – CUBA. SANTIAGO DE CUBA:** vicinity of Museo de la Francesca, La Gran Isabelita, 2 km SE of La Gran Piedra, 1000 m, open secondary forest on ridge, 7.iv.1982, *R.C. Harris 14609* (NY). **PUERTO RICO. CAGUAS:** Carite Forest Reserve, at intersection of Hwys 184 and 179, 900 m, wet submontane forest, 9.vi.1988, *R.C. Harris 22473* (NY). **HUMACAO:** Caribbean National Forest, Luquillo Division, El Toro Mountain trail from El Verde side on Hwy 186, 1000–1074 m, mossy cloud forest at summit, 4.vi.1988, *W.R. Buck 16016* (NY), *R.C. Harris 22215* (NY), *R.C. Harris 22252* (NY), *R.C. Harris 22263* (NY). **PONCE:** Cordillera Central, Caribbean National Forest, Toro Negro Division along Hwy 143 at km 20, 1000–1200 m, lower montane wet broad-leaf-palm-tree fern forest on windward slope, 2.vi.1988, *R.C. Harris 22073B* (NY).

***Thelotrema rockii* (Zahlbr.) Hale – (FIGURE 19E). PUERTO RICO. CAGUAS:** Carite Forest Reserve, at intersection of Hwys 184 and 179; 900 m, wet submontane forest, 9.vi.1988, *R.C. Harris 22462* (NY).

***Thelotrema similans* Nyl. – JAMAICA.** Cinchona, 1500 m, 15.vii.1919, *C.C. Plitt s.n.* (NY).

***Thelotrema subtile* Tuck. – PUERTO RICO.** Yauco, dry hill, on bark, 29.xii.1915, *B. Fink 509* (NY).

***Wirthiotrema glaucopallens* (Nyl.) Rivas Plata & Kalb – JAMAICA.** Cockpit Country, 13–18.ix.1906, *N.L. Britton & D.W. Marble 357* (NY). **ST. THOMAS PARISH:** Bath, trail N from Bath Fountain Hotel along Sulphur River, 17°58′S, 76°21′W, mature riverine forest, 8.iv.1981, *W.R. Buck 5497* (NY); S slope of Winchester Peak, 1.1 mi NW of Wheelerfield, S end of John Crow Mts., 17°58′N, 76°18′W, 350 m, dry, virgin forest on rough limestome, 10.iv.1981, *W.R. Buck 5613* (NY). **CUBA.** Alto Cedro, 1.iii.1903, *L.M. Underwood & F.S. Earle 1535* (NY); Isle of Pines, Coe's Camp, Ensenada de Siguanea, 25.ii.1916, *N.L. Britton & P. Wilson 14908* (NY). **ORIENTE:** Sierra Nipe, near Woodfred, 360–550 m, 1.i.1910, *J.A. Shafer 3742* (NY); La Prenda, 1.xii.1921, *Bro. Hioram 5341* (NY). **PUERTO RICO.** Rubinito, 610 m, wood on bark, 6.i.1916, *B. Fink 2003* (NY); Caribbean National Forest, Luquillo Division, El Verde, vicinity of El Verde Biological Station, rainforest, 23–24.ii.1981, *W.R. Buck 3464* (NY). **DOMINICA. PARISH OF ST. DAVID:** L'Or River, 300 m, rain forest, 20.xi.1963, *H.A. Imshaug & F. Imshaug 33180* (NY). **DOMINICA.** Imperial Road, 1903, *F.E. Lloyd 936* (NY). **ST. LUCIA. QUARTERS OF CASTRIES AND DENNERY:** Mt. La Combe, Barre de L'Isle Ridge, 300-440 m, lower montane forest to montane thicket, 19.vii.1963, *H.A. Imshaug & F. Imshaug 30050* (NY). **TRINIDAD AND TOBAGO. TRINIDAD:** NW Waller Field, foot of Heights of Guanapo, on cocoa, without date, *H. Fleming s.n.* (NY). **TOBAGO:** N slope of Main Ridge at about 8 mile post on old Roxborough-Bloody Bay Mule road, 460 m, lower montane rain forest, 29.ix.1963, *H.A. Imshaug & F. Imshaug 31625* (NY). **SURINAME. SIPALIWINI:** Kayserberg Airstrip, loop trail S of airstrip, 03°06′N, 56°28′W, 227 m, 1.vi.2003, *B.H. Allen 25134* (NY). **BRAZIL. AMAZONAS:** along W shore of Rio Uatumã at junction of Rio Pitinga, 01°31′N, 59°50′W, primary forest, on trunk of small tree, 24–27.viii.1979, *W.R. Buck 3096* (NY), on vine, *W.R. Buck 3080* (NY), *W.R. Buck 3188* (NY). Reserva Ducke, near Manaus; 14 October 1965, *Lowy 1133BR* (NY). **BAHIA:** Municipio of Ilheus, area do CEPEC (Centro de Pesquisas do Cacao), km 22 on road between Ilheus and Itabuna (BR 415), southern Bahia hygrophilous forest, on tree root in shade, 9.iv.1991, *S.L. Oliveira & A.C.M. de Almeida 18* (NY); Município de Ilhéus, Cidade de Ilhéus, Mata da Esperança entry point 2 km from the old bridge over the Rio Fundão, 14°47′S, 39°04′W, southern Bahia hygrophilous forest, on living trunk in indirect light, 14.iii.1995, *L. Lisbôa de Oliveira 78* (NY). **PARÁ:** Macau Airstrip, 1.5 hours upstream from Lageira airstrip, on Rio Maicuru, 00°55′N, 54°26′W, 240 m, Varzea forest, on live tree, 23.vii.1981, *J.J. Strudwick & G.L. Sobel 3451* (NY).

***Wirthiotrema trypaneoides* (Nyl.) Rivas Plata & Lücking – (FIGURE 19F). BERMUDA:** unknown locality, on *Elaeodendron*, 29.xi-14.xii.1912, *S. Brown et al. 1581* (NY), *S. Brown et al. 1582* (NY), *S. Brown et al. 1588* (NY). **DOMINICAN REPUBLIC. SAMANÁ:** Base of Loma de Pan de Azucar, near La Laguna and Río San Juán; sea level; pastures with hedgerows, 19.v.1982, *W.R.*

Buck 8743 (NY). **EL SEIBO:** 7 km S of Sabana de la Mar on road from El Valle, 18°55′N, 69°22′W, cacao plantation, 28.iii.1981, *W.R. Buck 4984* (NY). **PUERTO PLATA:** 4.5 km S of Sosúa-Puerto Plata Hwy at Sosúa just W of Río Sosúa, near source of Río Sosúa, 19°41′N, 70°31′W, moist primary forest near sea level, 24.i.1991, *Harris 26759* (NY). **HAITI.** Gorge below road from Petionville to Kenscoff, 1200 m, 12.vi.1935, *W.W. Thomas 140C* (NY). **PUERTO RICO. UTUADO:** Mt. Morales, near Utuado, upper slopes on bark, 19.iii.1906, *M.A. Howe 1226* (NY); Cordillera Central, Reserva Forestal Maricao, trail leading from Hwy 120 at km 14 to river below moist serpentine outcrop, 1.iii.1981, *W.R. Buck 3875* (NY), *W.R. Buck 3841* (NY). **FEDERATION OF ST. KITTS AND NEVIS. ST. THOMAS MIDDLE ISLAND PARISH:** St. Kitts, Wingfield Manor Estate, 17°20′N, 62°47′W, 400–450 m, semi-moist forest on steep slope, 12.ii.1996, *R.C. Harris 38215* (NY). **BRAZIL. BAHIA:** Municipio of Ilheus, CEPEC (Centro de Pesquisas do Cacao), km 22 on BR 415 between Ilheus and Itabuna, in Parque Zoobotânico, 14°50′S, 39°13′W, 50 m, southern Bahia hygrophilous forest, overgrown cacao plantation, 15.vii.1991, *D. Vital & W.R. Buck 20143* (NY), *D. Vital & W.R. Buck 20145* (NY), growing on tree in shade, 9.iv.1991, *S.L. Oliveira & A.C.M. de Almeida 15* (NY).

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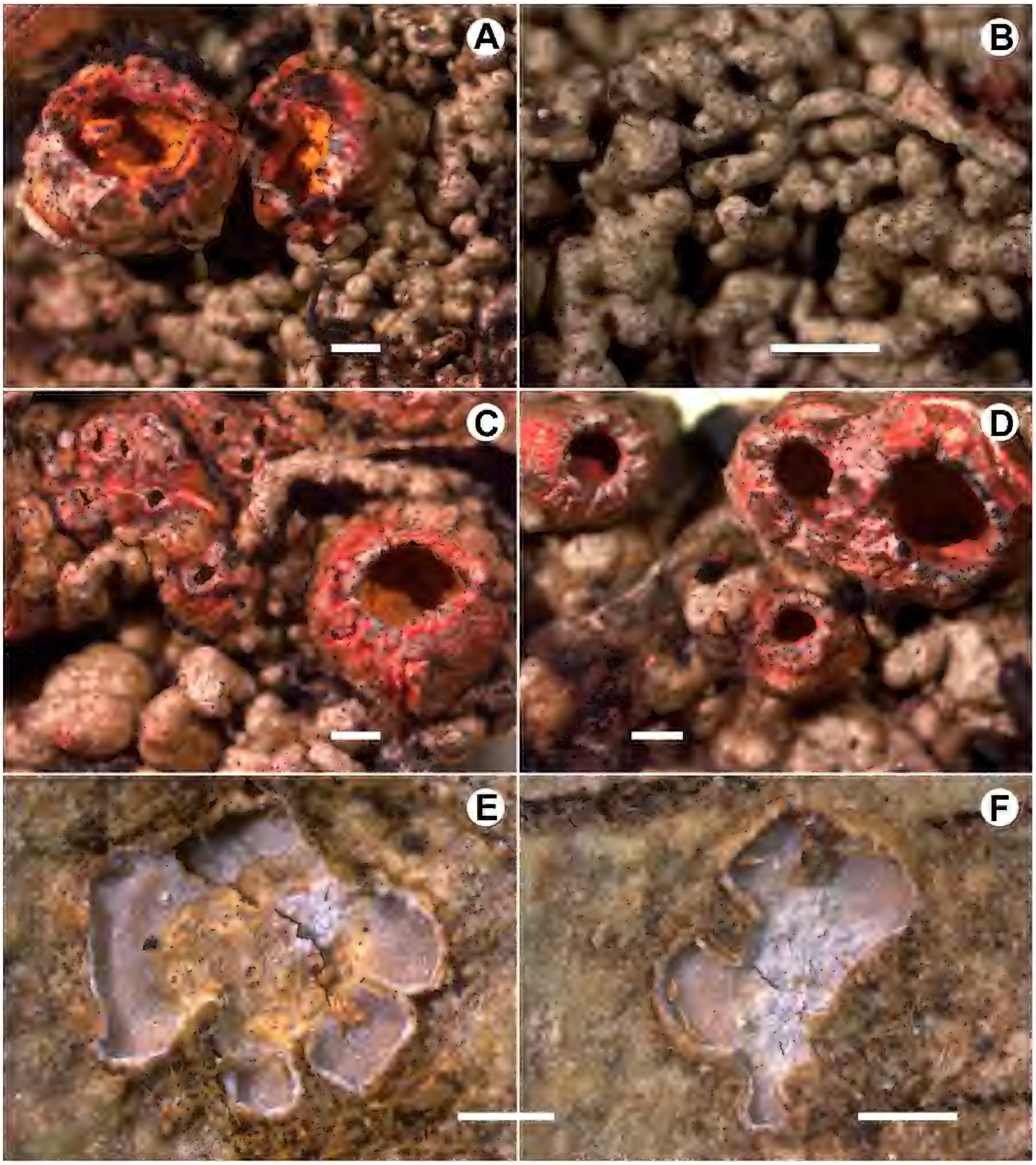

Figure 1. A–D, *Ampliotrema sanguineum* (holotype). E–F, *Astrochapsa lobata* (holotype). Scale = 1 mm.

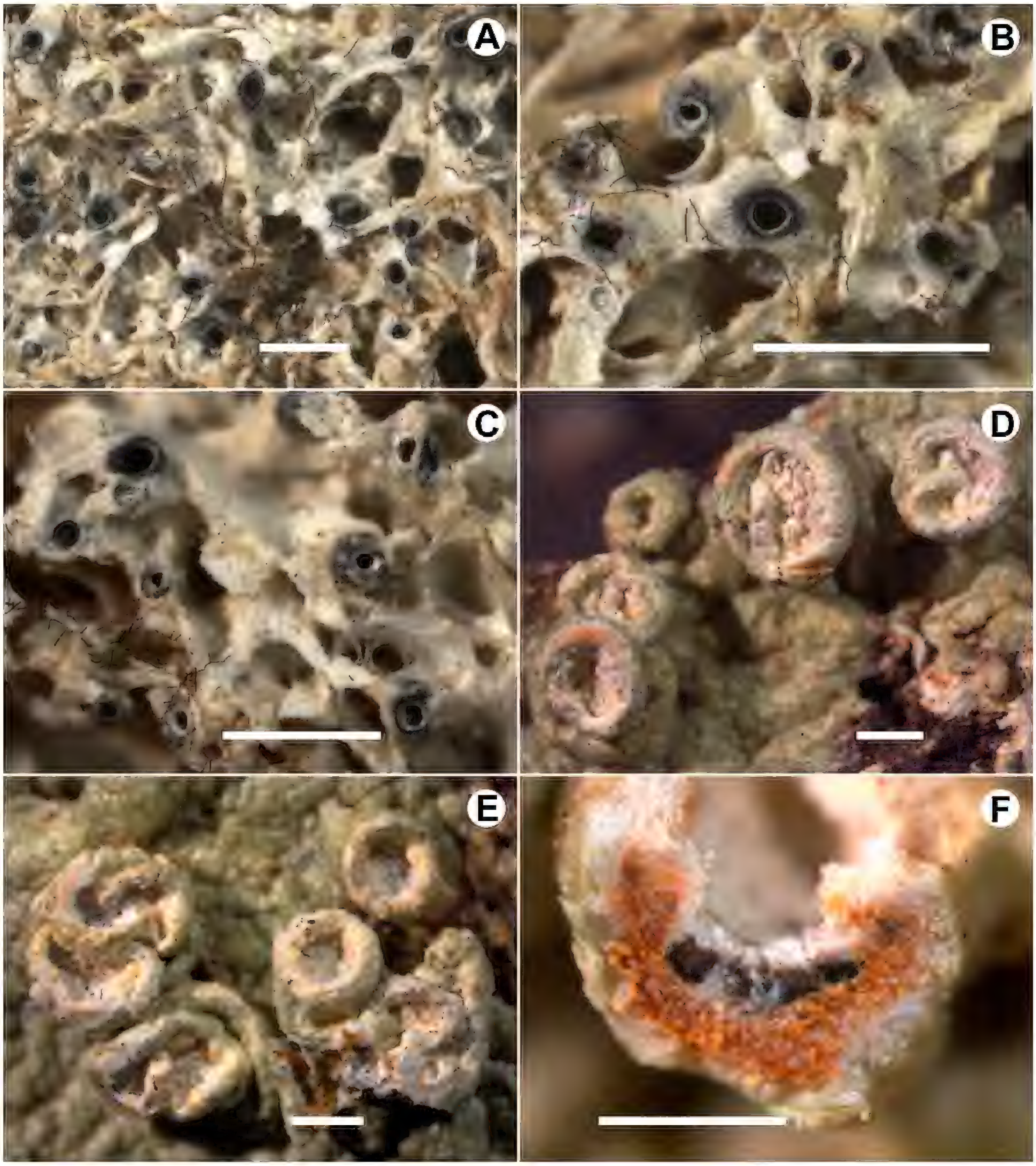

Figure 2. A–C, *Clandestinotrema hepaticola* (holotype). D–F, *Glaucotrema bahianum* (holotype). Scale = 1 mm.

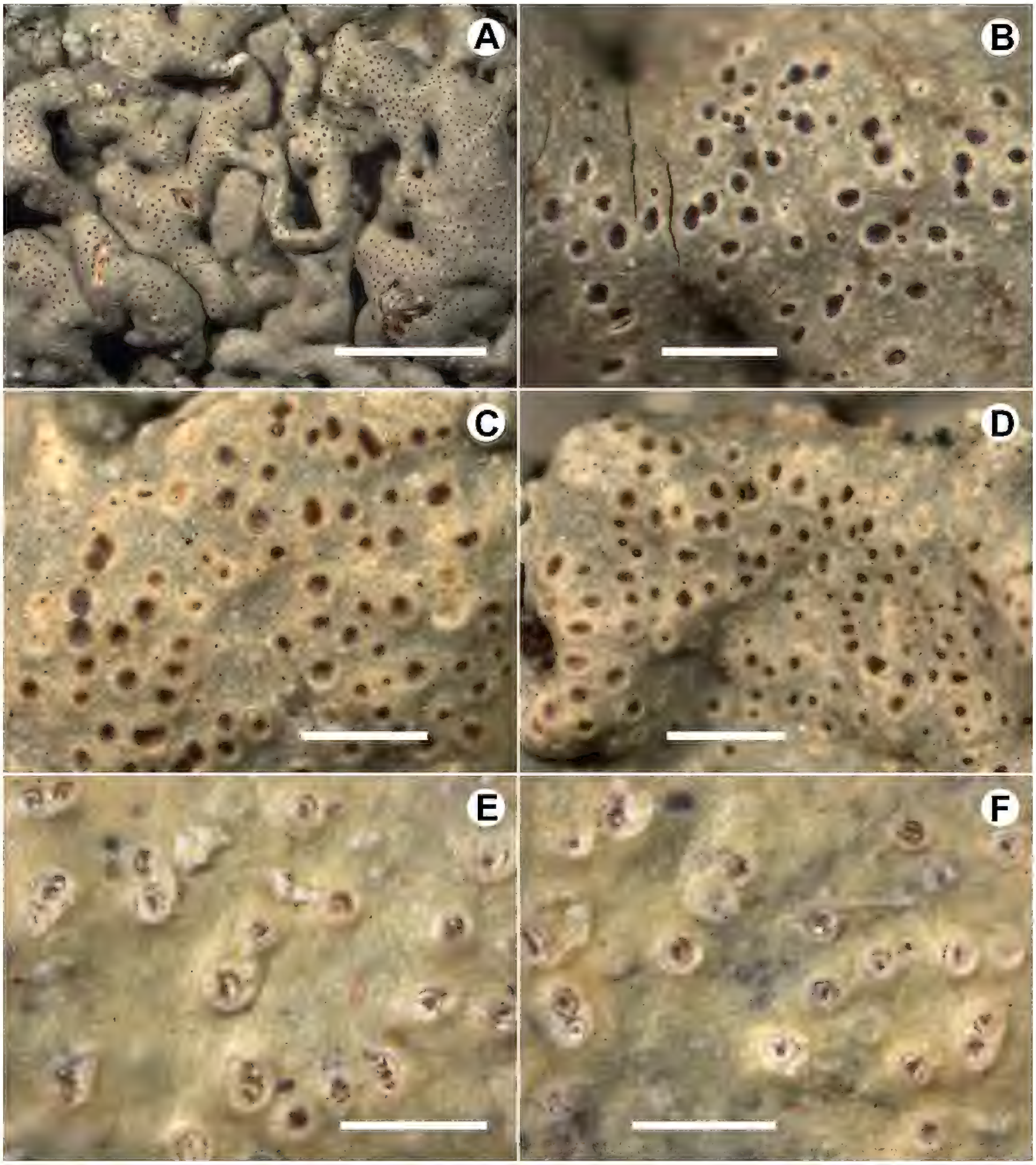

Figure 3. A–D, *Leucodecton minisporum* (A–B, Dominican Republic, *Buck 5144*; C–D, holotype). E–F, *L. uatumense* (holotype). Scale = 1 mm, in A = 10 mm.

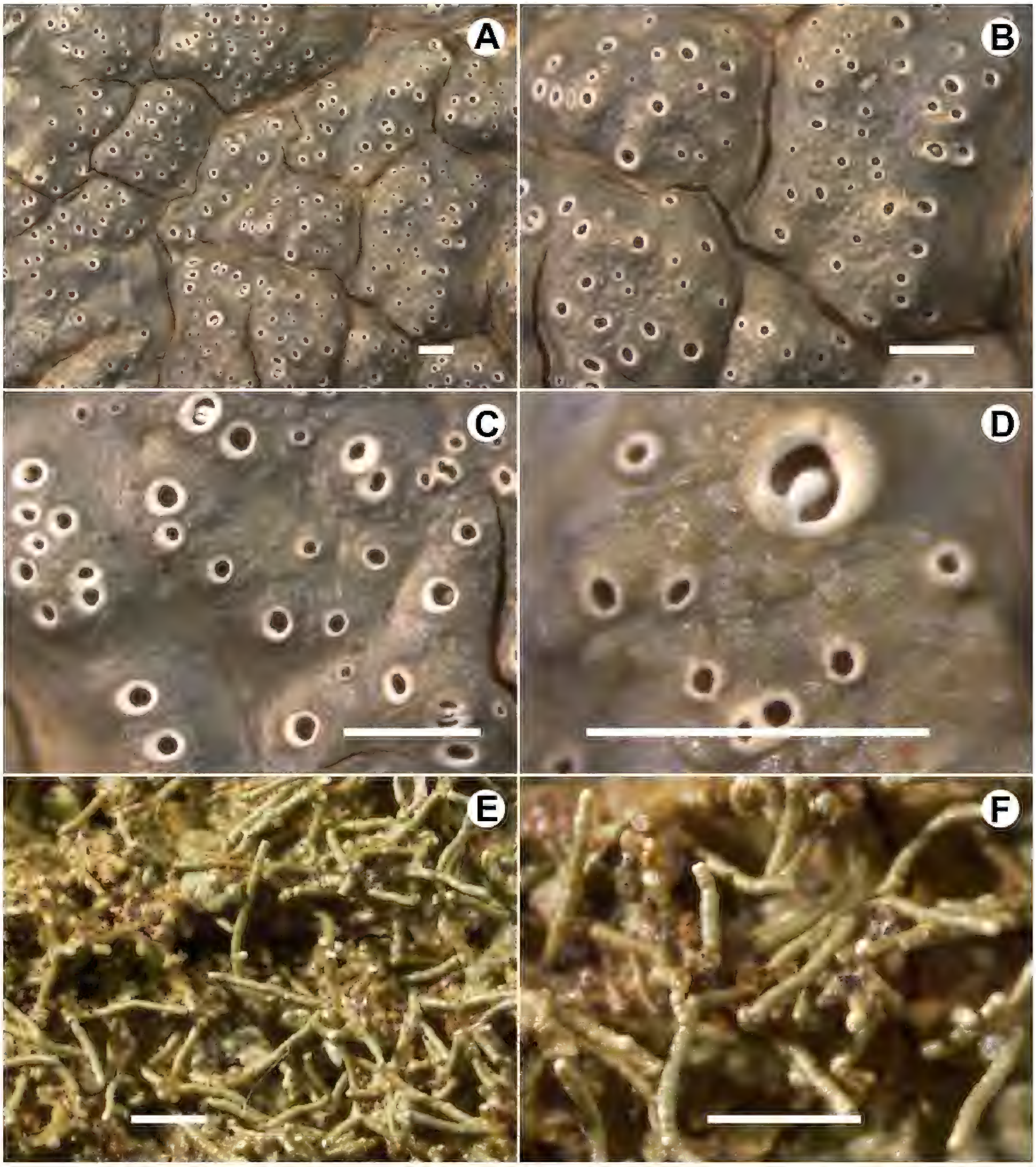

Figure 4. A–D, *Myriotrema arimense* (holotype). E–F, *M. maroense* (holotype). Scale = 1 mm.

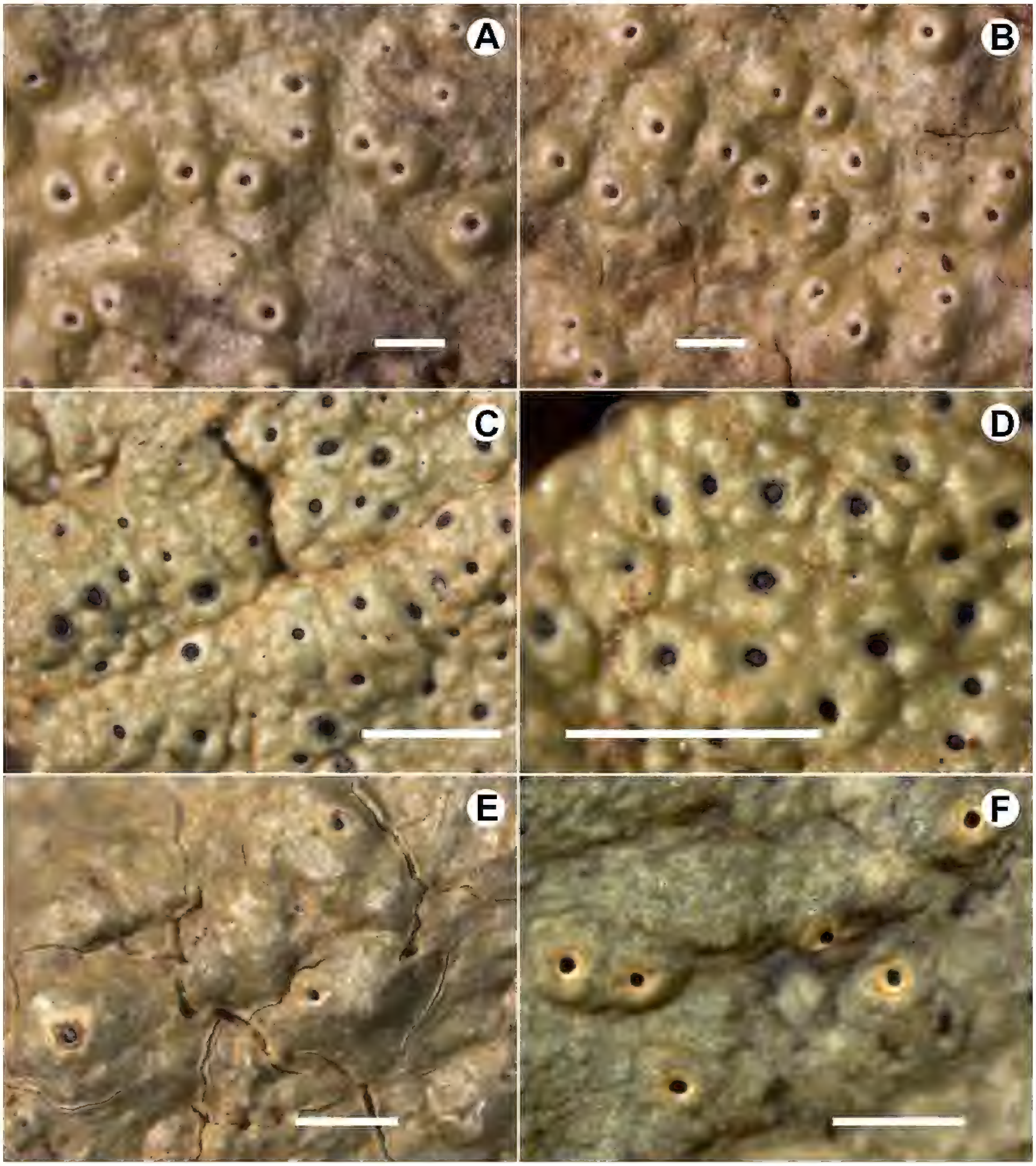

Figure 5. A–B, *Ocellularia baorucensis* (holotype). C–D, *O. buckii* (holotype). E, *O. caraibica* (holotype). F, *O. comayaguana* (holotype). Scale = 1 mm.

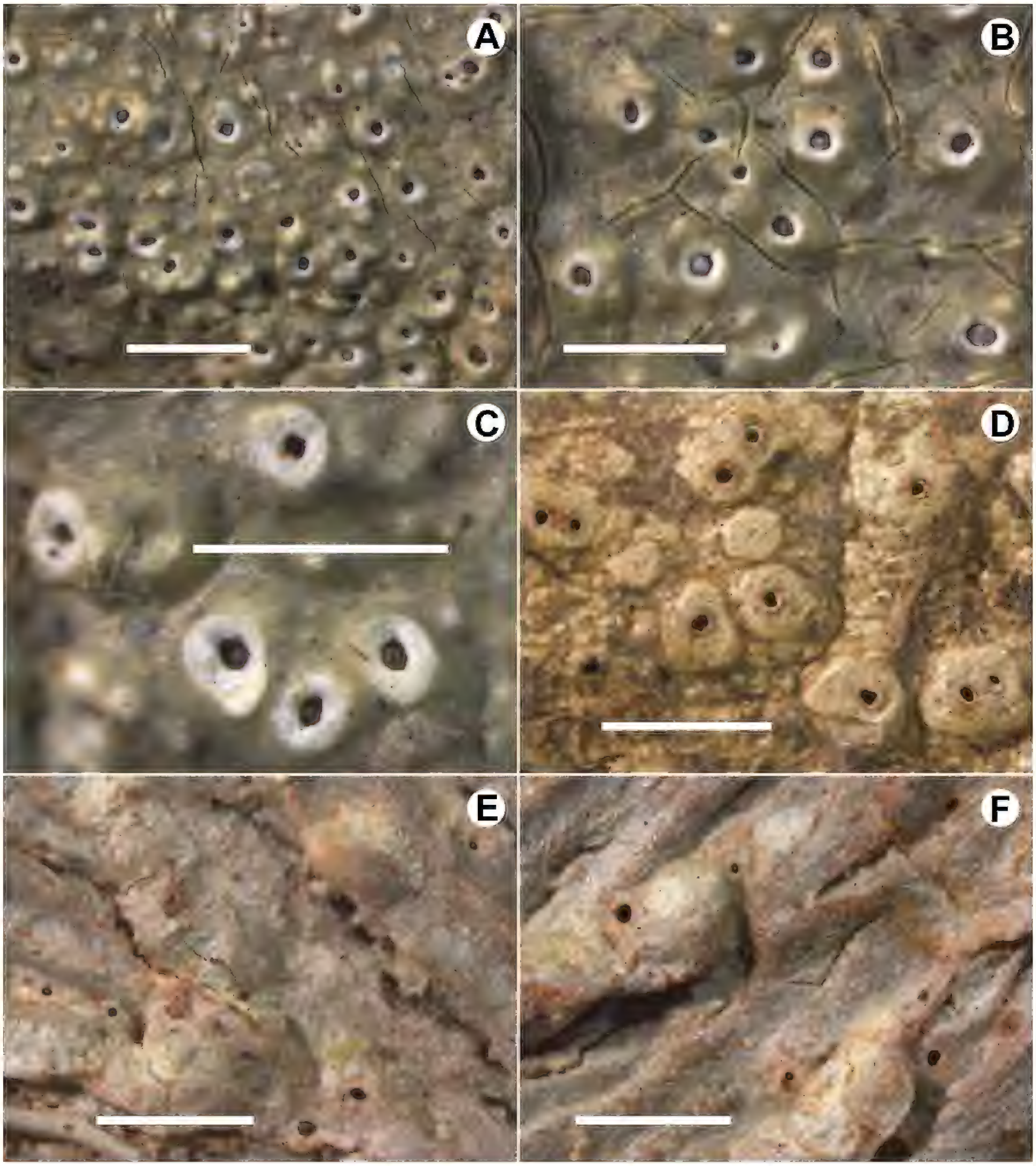

Figure 6. A–C, *Ocellularia daniana* (holotype). D, *O. dussii* (holotype). E–F, *O. endoperidermica* (holotype). Scale = 1 mm.

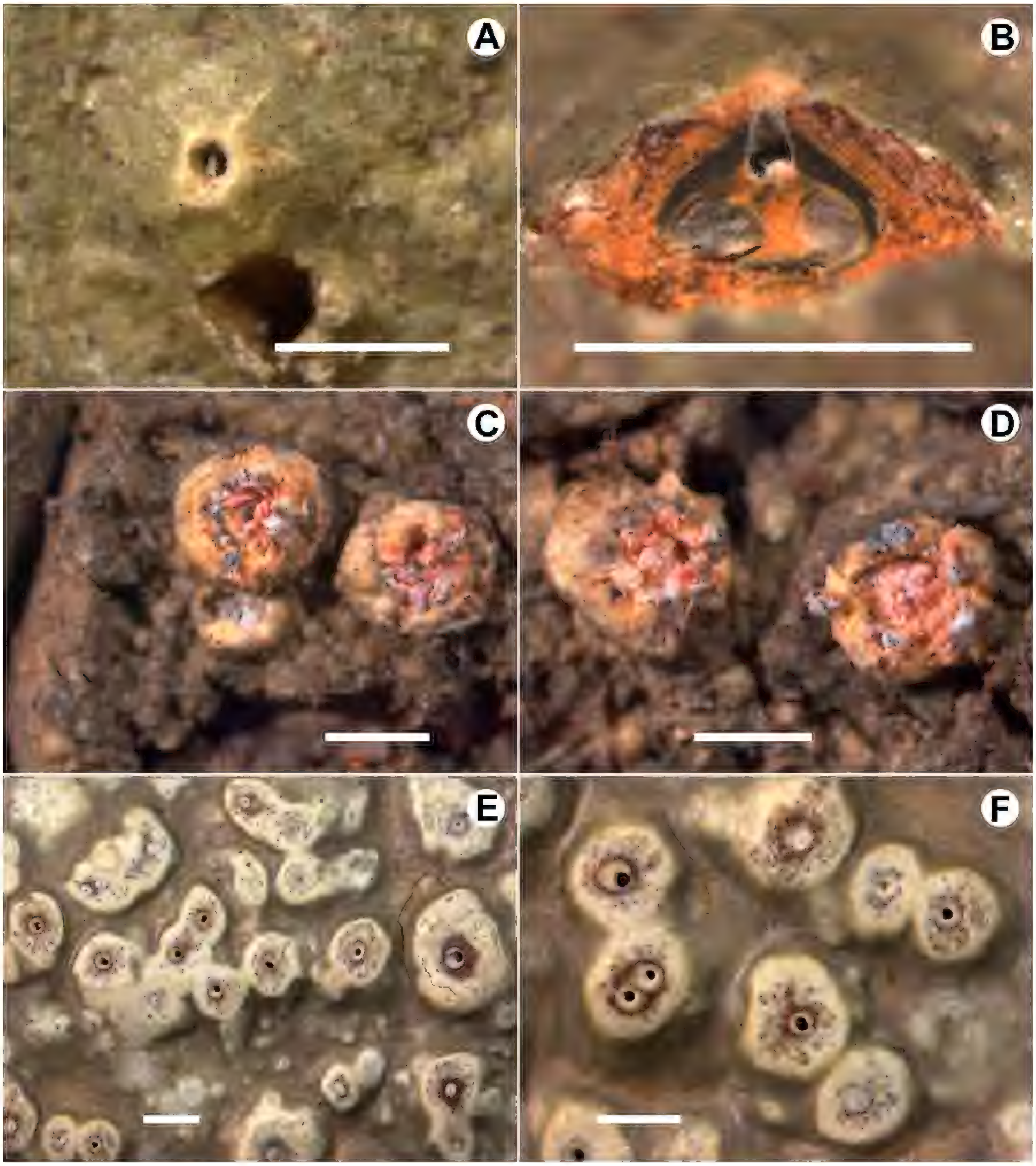

Figure 7. A–B, *Ocellularia granpiedrensis* (holotype). C–D, *O. imshaugii* (holotype). E–F, *O. liamuiga* (holotype). Scale = 1 mm.

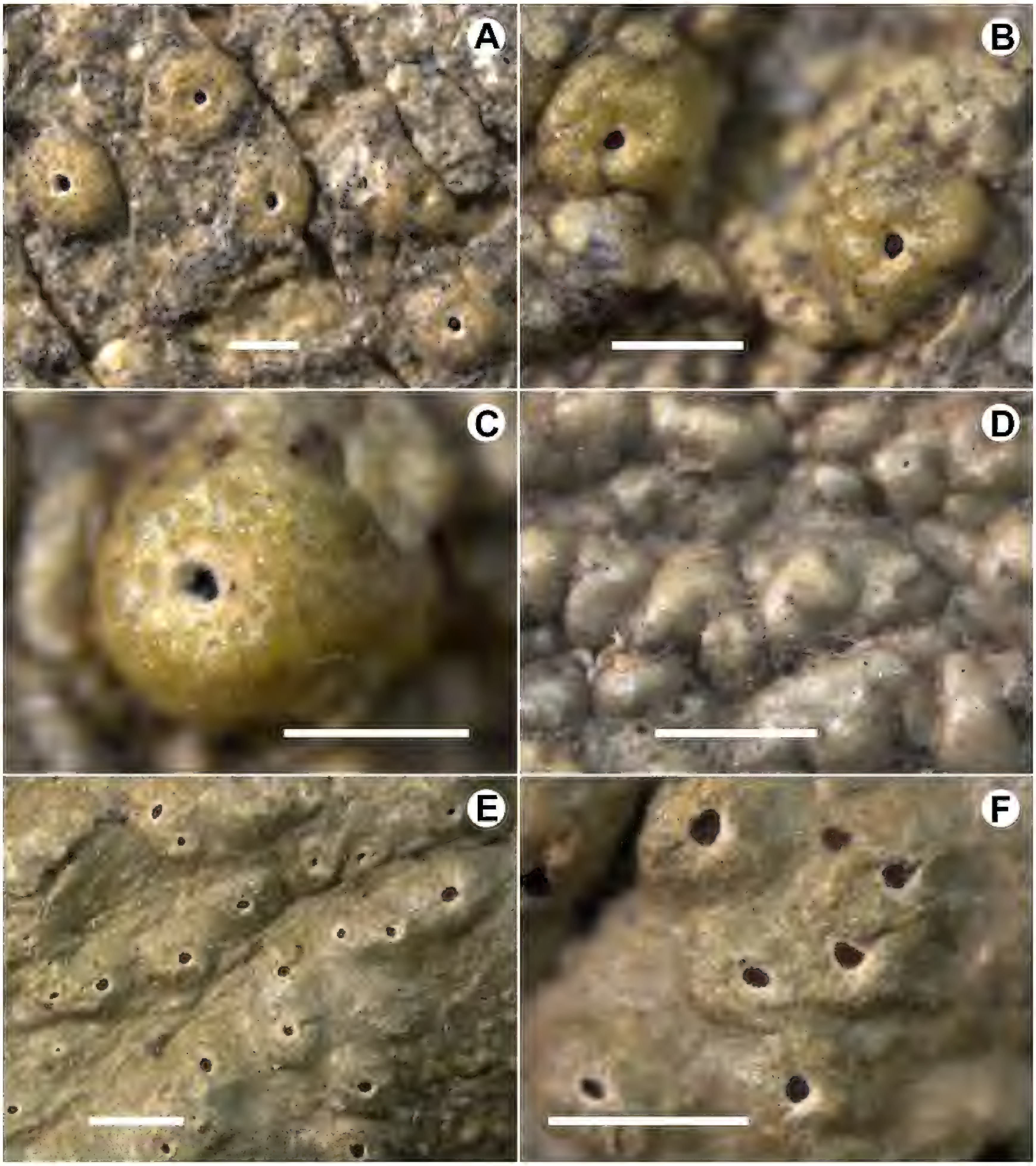

Figure 8. A–C, *Ocellularia macrospora* (holotype). D, *O. maricaoensis* (holotype). E–F, *O. pichinchensis* (holotype). Scale = 1 mm.

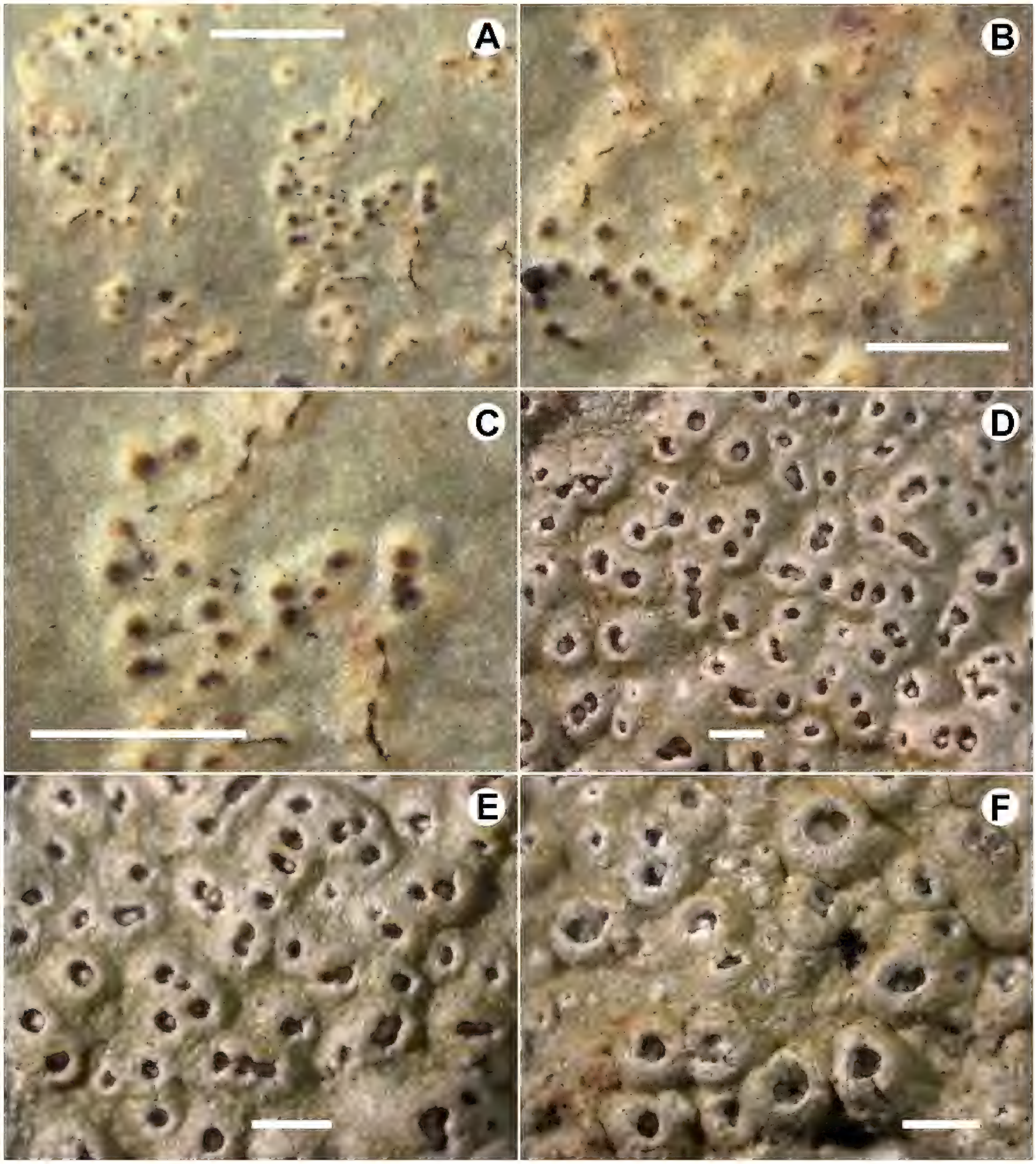

Figure 9. A–C, *Pycnotrema fissurinum* (holotype). D–F, *Rhabdodiscus trinitatis* (holotype). Scale = 1 mm.

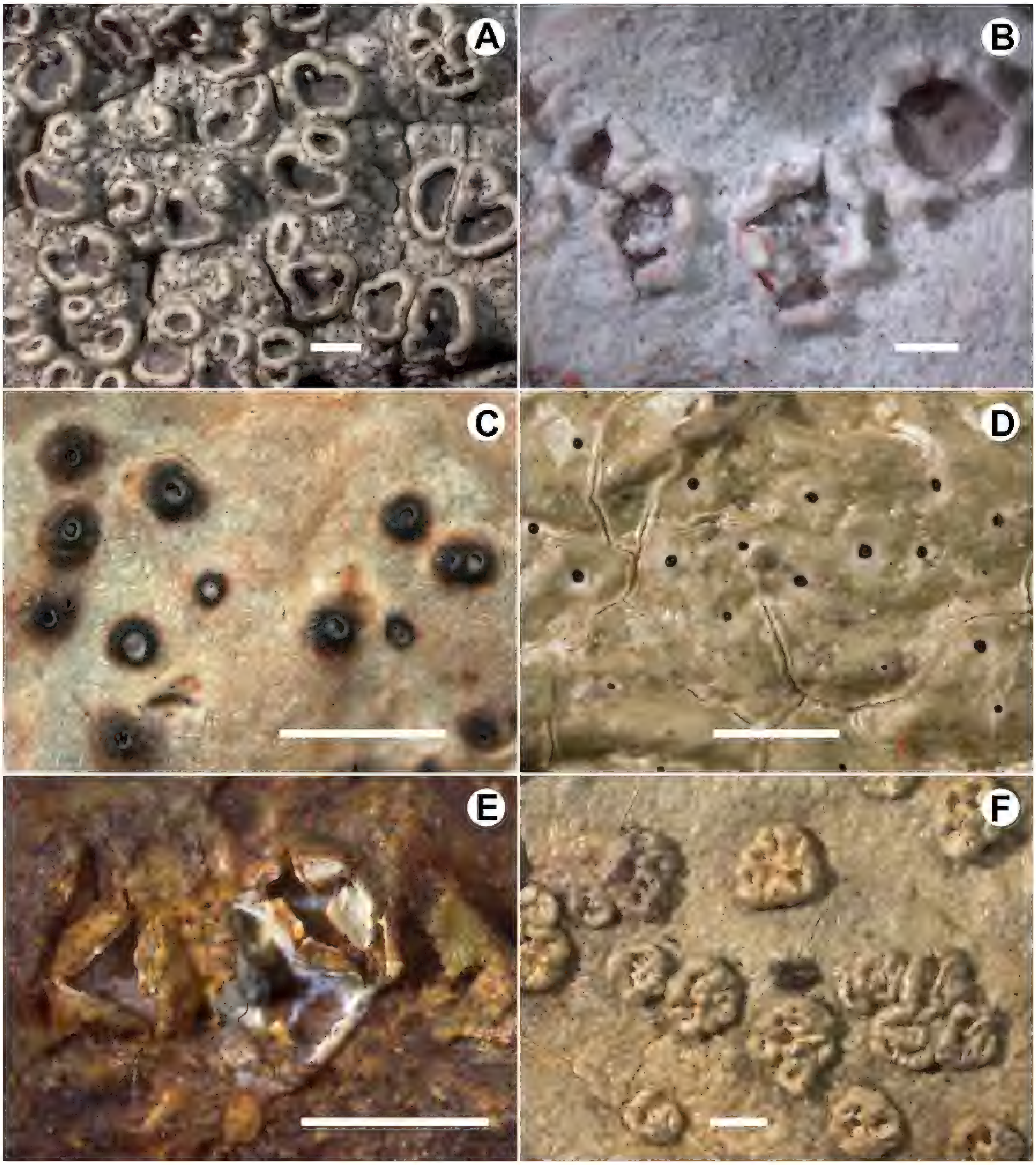

Figure 10. A, *Anomomorpha lecanorina* (Venezuela, *Guariglia et al. 1663*). B, *Chapsa diploschistoides* (Trinidad and Tobago, *Fleming s.n.*). C, *Clandestinotrema analorenae* (Dominica, *Imshaug & Imshaug 32942*). D, *Clandestinotrema clandestinum* (Dominican Republic, *Harris 15582*). E, *Cruentotrema amazonum* (Brazil, *Buck 3064*). F, *Glaucotrema stegoboloides* (Brazil, *Boom & Mori 938*). Scale = 1 mm.

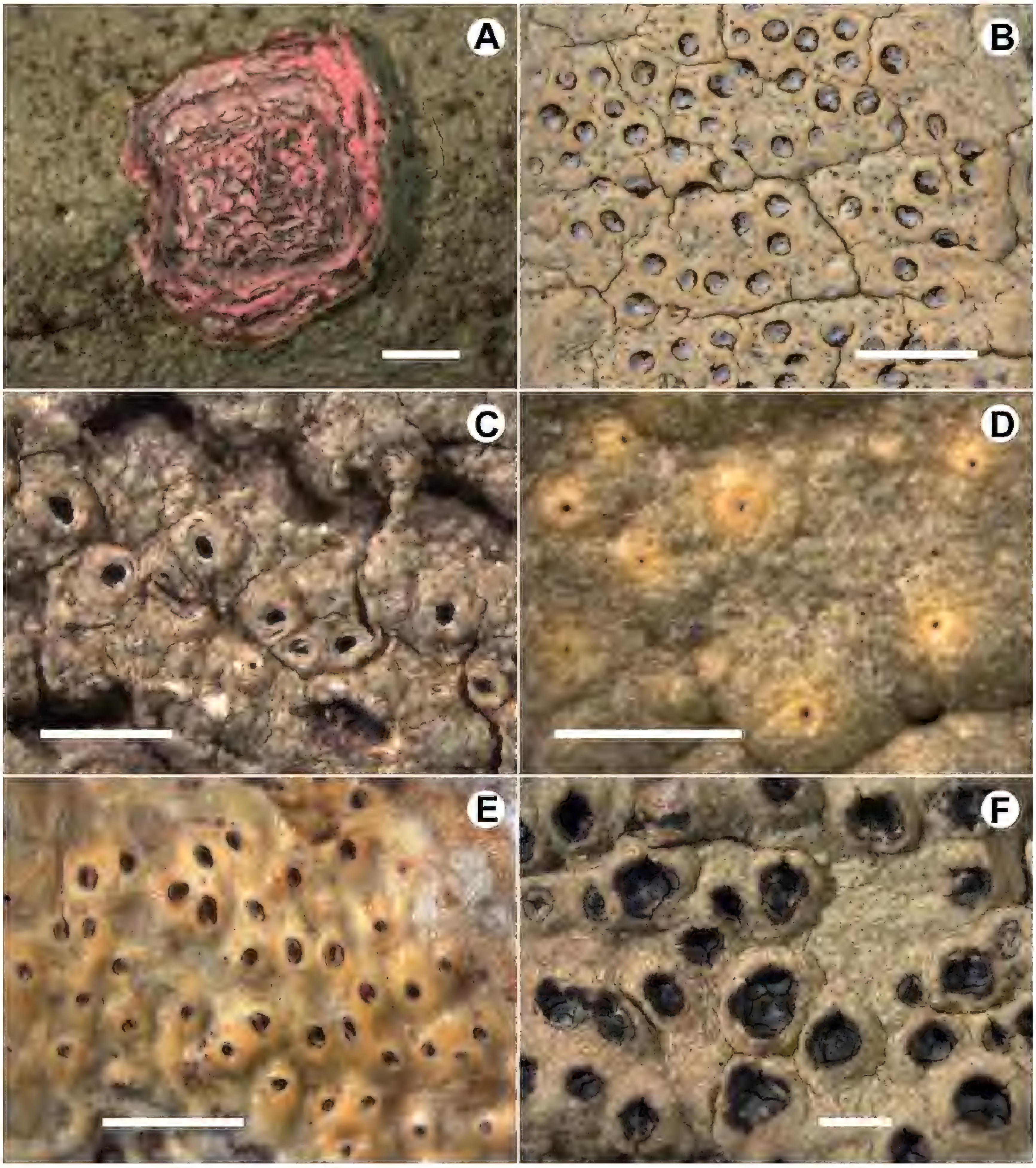

Figure 11. A, *Gyrotrema sinuosum* (Venezuela, *Buck 11453*). B, *Leucodecton occultum* (Puerto Rico, *Britton & Britton 9745*). C, *Leucodecton oxysporum* (Brazil, *Thomas 4242*). D, *Leucodecton sordidescens* (Bahamas, *Brace 2023*). E, *Leucodecton subcompunctum* (Belize, *Allen 15465B*). F, *Melanotrema platystomum* (Cuba, *Hart s.n.*). Scale = 1 mm.

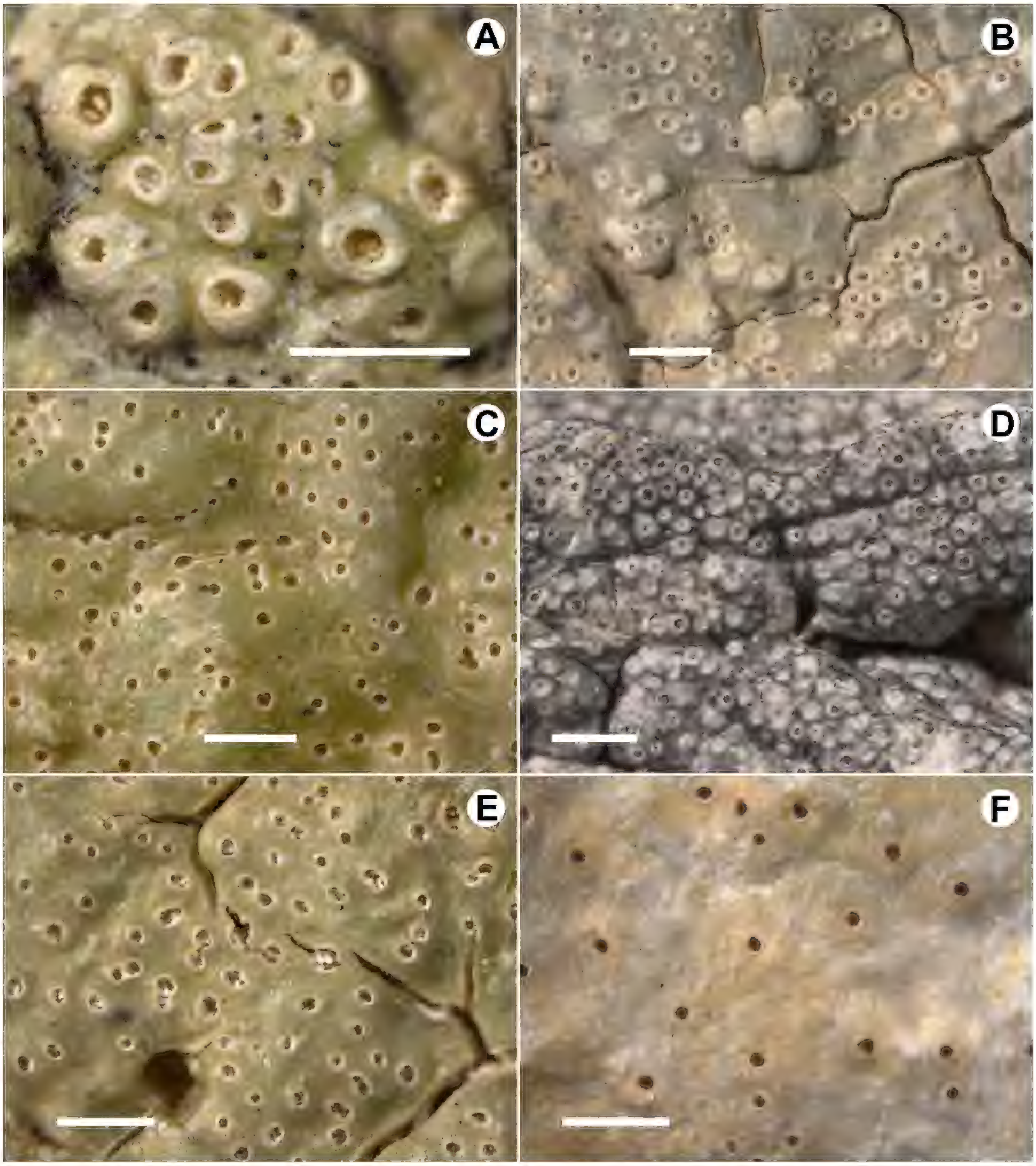

Figure 12. A, *Myriotrema congestum* (Guyana, *Pipoly & Boyan 8891*). B, *Myriotrema glauculum* (Trinidad and Tobago, *Fleming s.n.*). C, *Myriotrema* cf *polytretum* (Puerto Rico, *Buck 4083*). D, *Myriotrema microporum* (Brazil, *Buck 2978*). E, *Myriotrema myrioporoides* (Guyana, *Pipoly & Boyan 9000*). F, *Myriotrema myrioporum* (Brazil, *Buck 2941*). Scale = 1 mm.

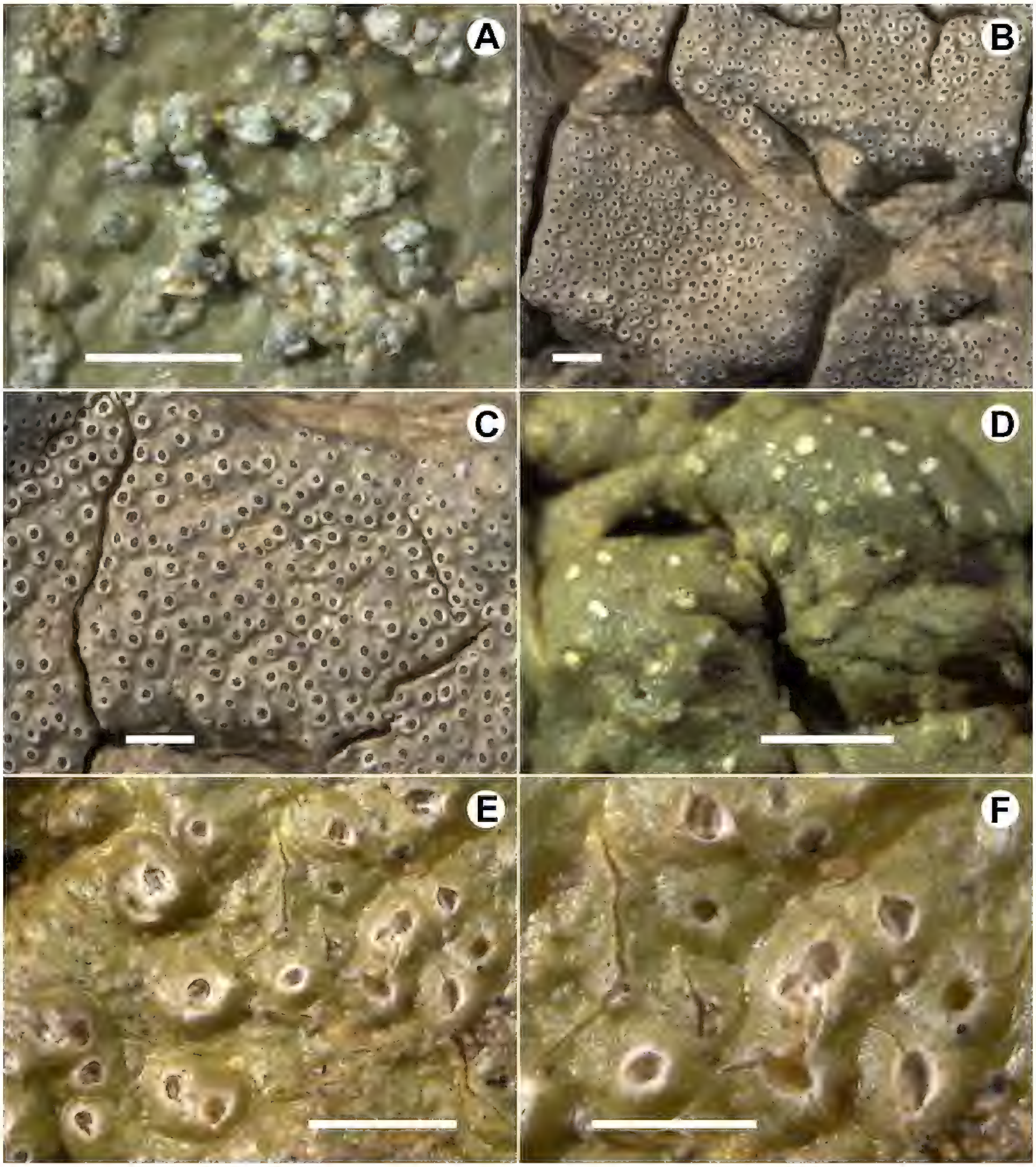

Figure 13. A, *Myriotrema neofrondosum* (Puerto Rico, *Harris 21995*). B–C, *Myriotrema olivaceum* (Jamaica, *Imshaug 13075*). D, *Myriotrema parvidiscum* (Guyana, *Pipoly & Boyan 8995*). E–F, *Myriotrema viridialbum* (Brazil, *Vital & Buck 20233*). Scale = 1 mm.

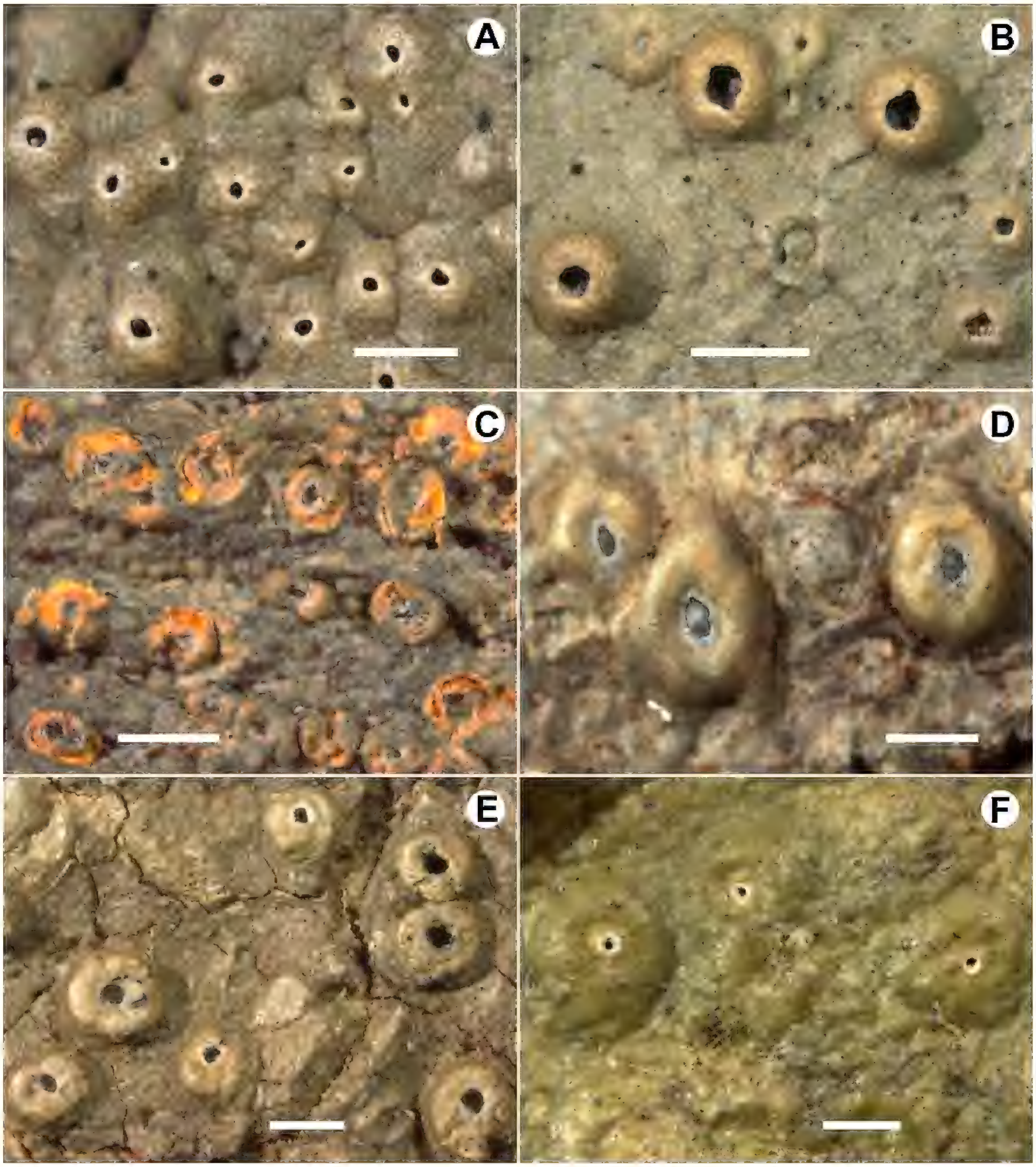

Figure 14. A–B, *Ocellularia bahiana* (A, Bahamas, *Britton 3178*; B, Brazil, *Boom & Mori 929*). C, *Ocellularia crocea* (Ecuador, *Harris 17835*). D, *Ocellularia domingensis* (Belize, *Allen 15465A*). E, *Ocellularia fecunda* (Panama, *Mori & Kallunki 4997*). F, *Ocellularia maxima* (Cuba, *Buck 7716*). Scale = 1 mm.

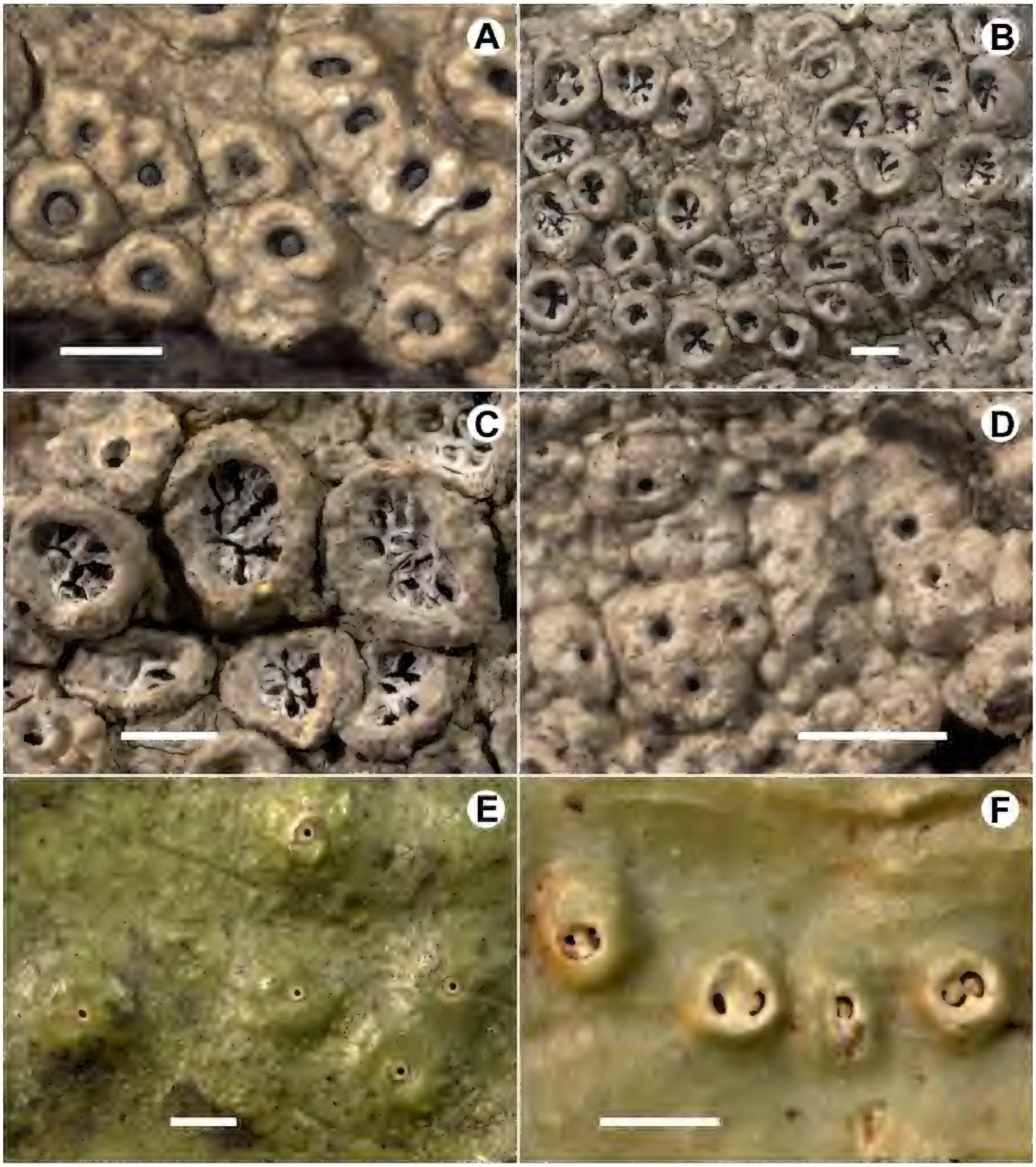

Figure 15. A, *Ocellularia obturascens* (Guadeloupe, *Duss 152*). B–C, *Ocellularia polydiscus* (Brazil, *Kalb s.n.*). D, *Ocellularia postposita* (Dominican Republic, *Harris 15046*). E, *Ocellularia praestans* (Puerto Rico, *Harris 21876*). F, *Ocellularia protocetrarica* (Brazil, *Buck 2580*). Scale = 1 mm.

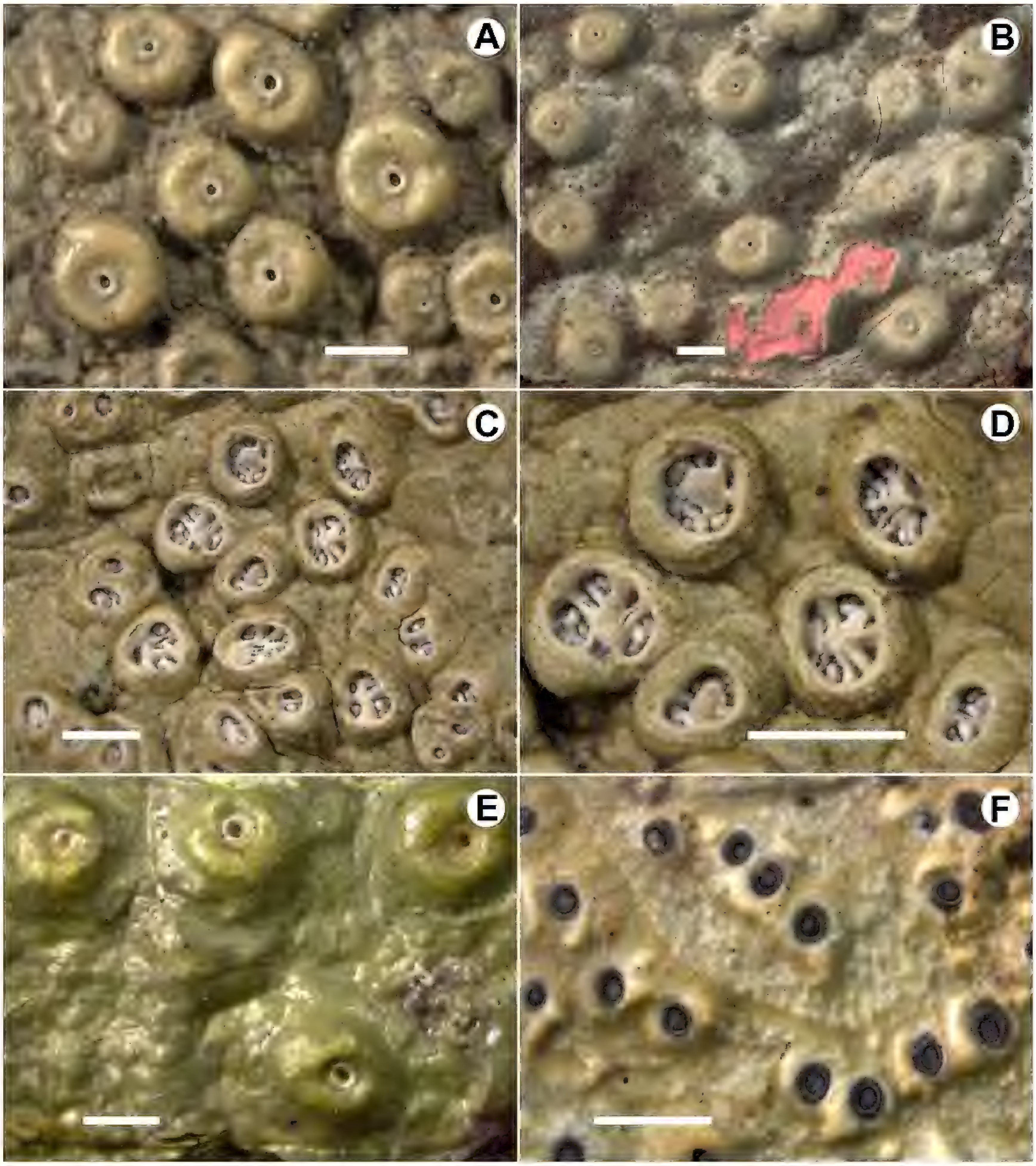

Figure 16. A, *Ocellularia rhabdospora* (Cuba, *Harris 14660*). B, *Ocellularia rhodostroma* (Guadeloupe, *Duss 1031a*). C–D, *Ocellularia rudior* (Cuba, *Bro (Hioram 5521*). E, *Ocellularia sanfordiana* (Cuba, *Harris 14635*). F, *Ocellularia subperforata* (Dominican Republic, *Buck 4994*). Scale = 1 mm.

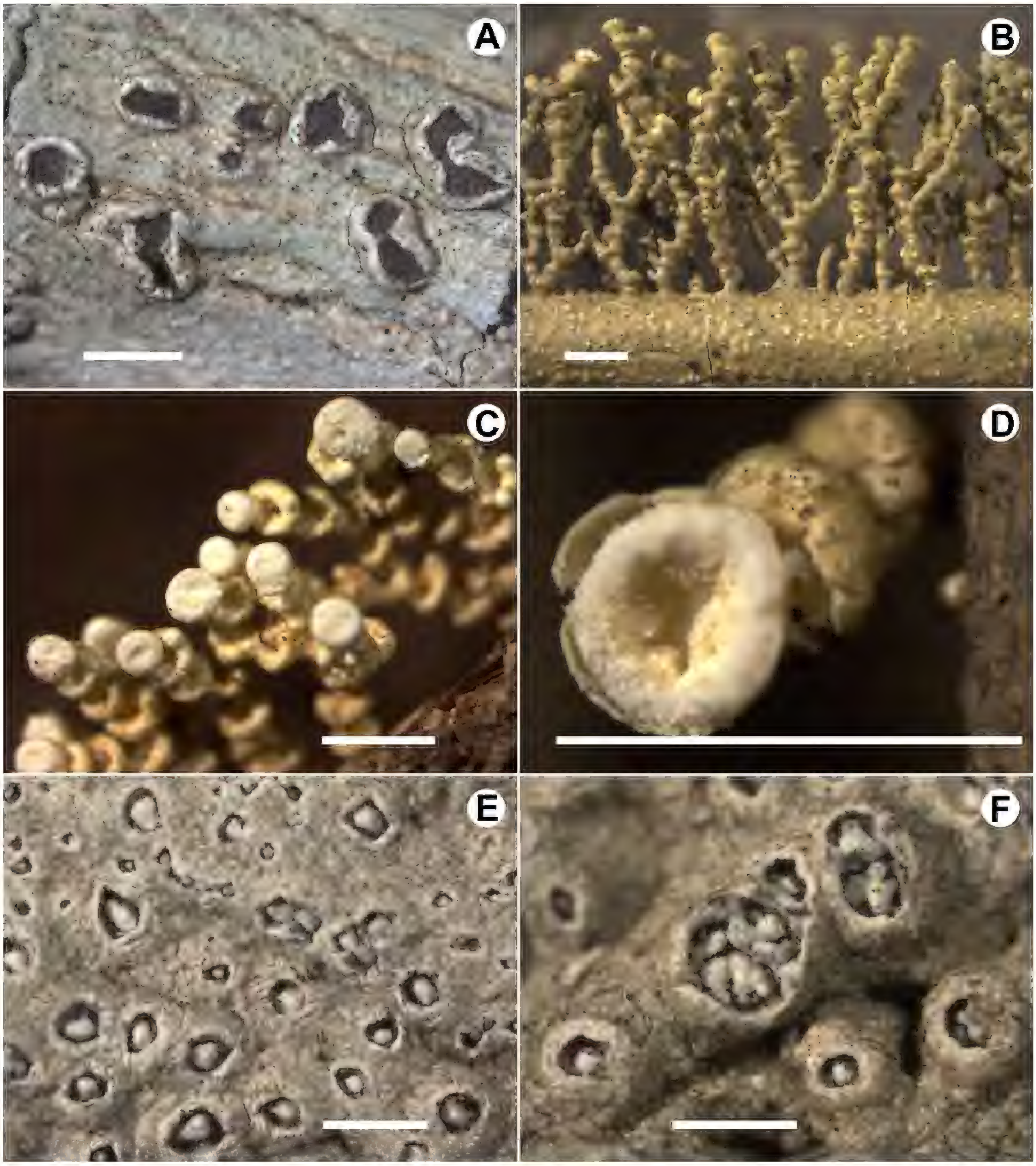

Figure 17. A, *Phaeographis spondaica* (Puerto Rico, *Buck 16010*). B–D, *Polistroma fernandezii* (B, Brazil, *Silva et al. 36088*; C, Suriname, *Pursell 11737*; D, French Guiana, *Boom & Mori 1490*). E–F, *Redingeria microspora* (Colombia, *Baker 51*). Scale = 1 mm.

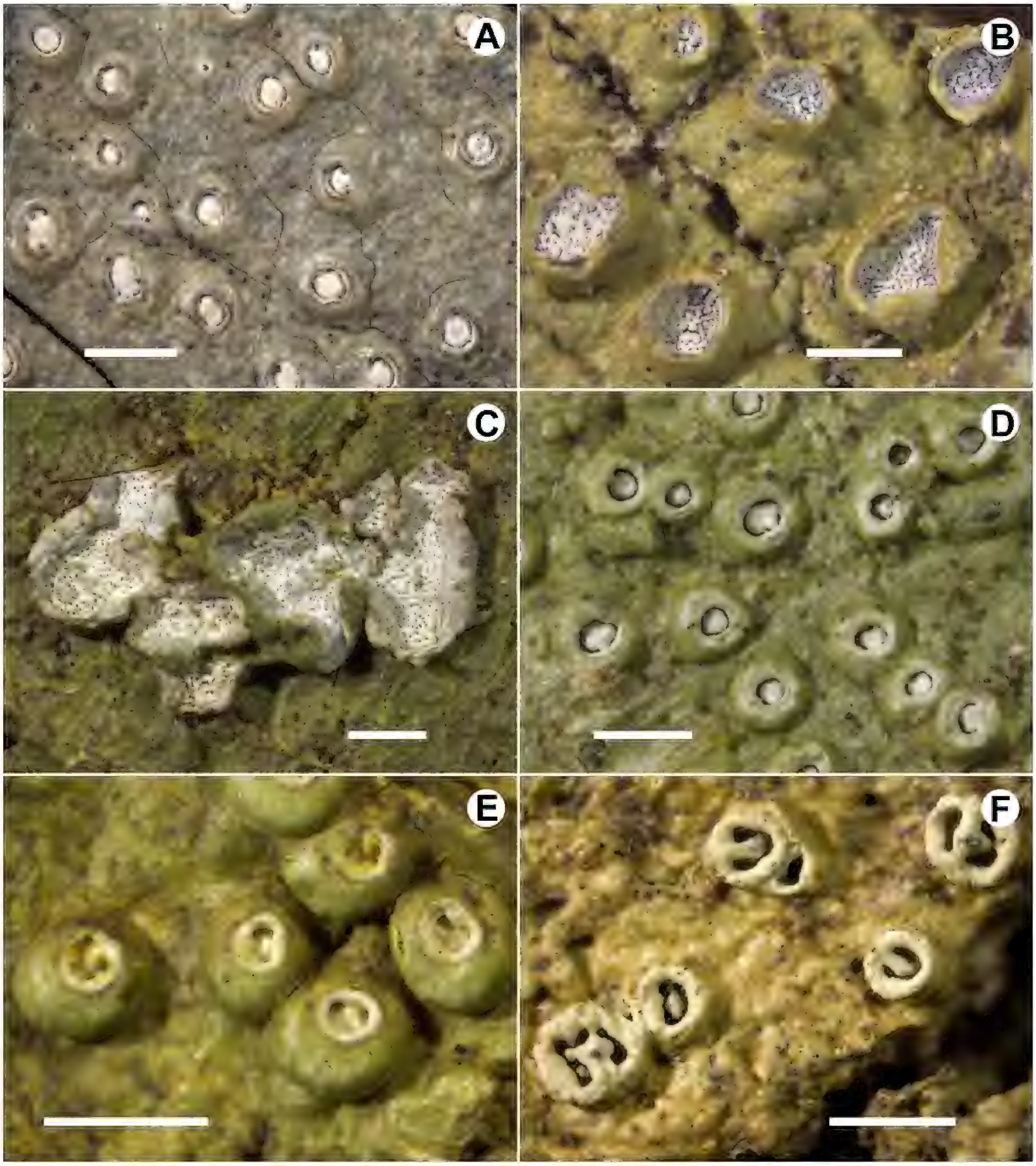

Figure 18. A, *Rhabdodiscus auberianus* (Cuba, *Harris 14578*). B–C, *Rhabdodiscus anamorphoides* (B, Brazil, *Boom & Mori 799*; C, Venezuela, *Buck 10818*). D, *Rhabdodiscus crassus* (Cuba, *Imshaug 24874*). E, *Rhabdodiscus jamaicensis* (Jamaica, *Cummings 98*). F, *Rhabdodiscus subemersus* (Jamaica, *Cummings 107*). Scale = 1 mm.

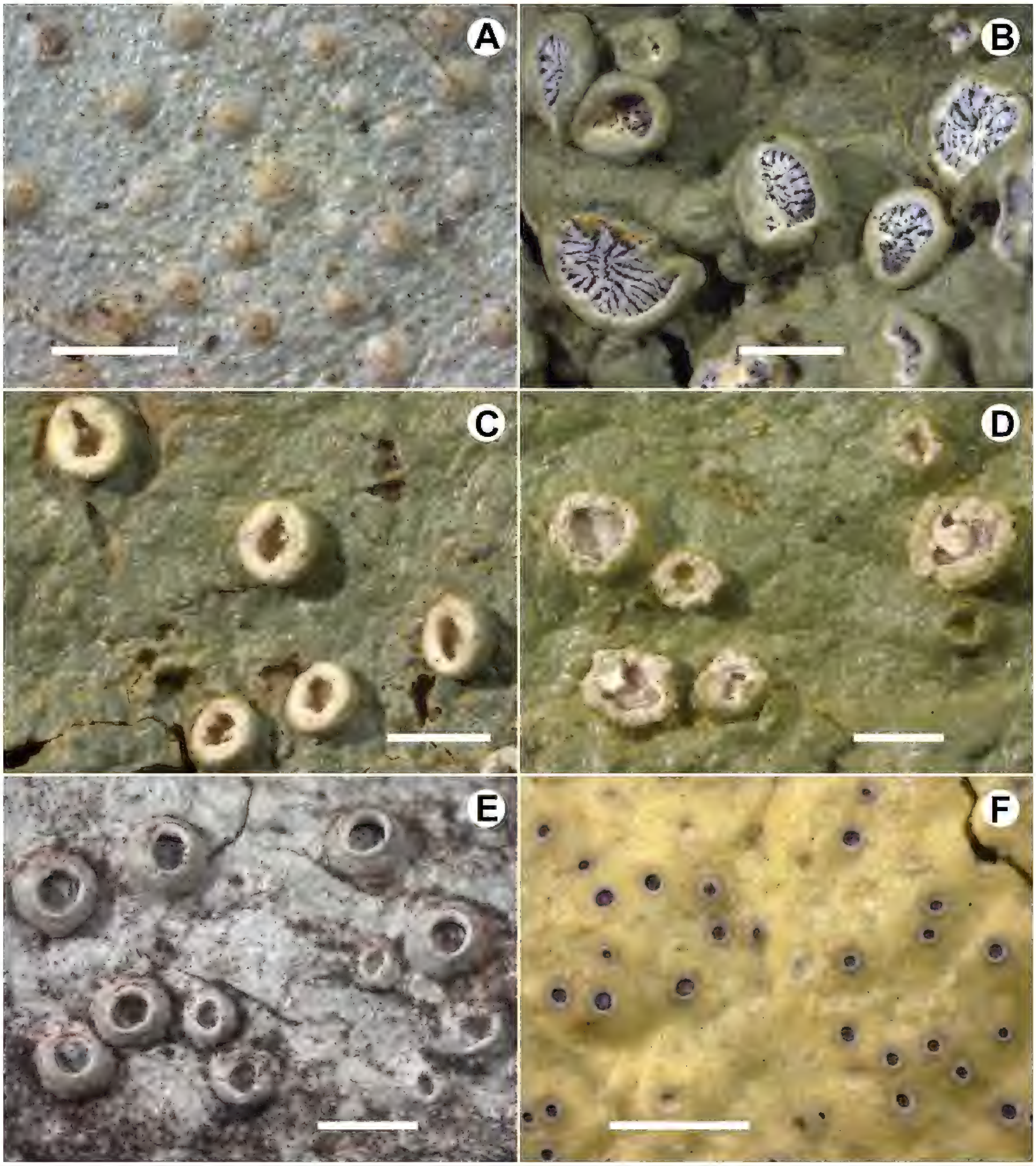

Figure 19. A, *Schizotrema cryptotrema* (Panama, *Nee & Mori 3693*). B, *Stegobolus radians* (Jamaica, *Cummings 131*). C–D, *Stegobolus wrightii* (C, Venezuela, *Buck 11394*; D, French Guiana, *Mori & Gracie 18863*). E, *Thelotrema rockii* (Puerto Rico, *Harris 22462*). F, *Wirthiotrema trypaneoides* (Dominican Republic, *Buck 8743*). Scale = 1 mm.

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Erratum: Valid publications of two combinations invalidly published in Opuscula Philolichenum 14: 1-57.

ROBERT LÜCKING[1]

Two new combinations in a recently published contribution on Thelotremataceae (Lücking 2015 *in* Opuscula Philolichenum 14: 1-57), on pages 22 and 23, were inadvertantly published with erroneous Mycobank registration numbers, having exactly the same number as the new species published on page 21, *Rhabdodiscus trinitatis* Lücking (#811198). As such the combinations were not validly published. They are validated here with the correct Mycobank numbers.

***Ocellularia rudior* (Vain.) Lücking comb. nov.**
Mycobank #811510.

≡ *Thelotrema rudius* Vain., Ann. Acad. Sci. Fenn., ser. A, 6(7): 135. 1915. **TYPE:** Guadeloupe, 1897, *P. Duss 152* (TUR-Vainio 26790!, holotype)
≡ *Leptotrema rudius* (Vain.) Zahlbr., Cat. Lich. Univers. 2: 639. 1923.
≡ *Ocellularia rudior* (Vain.) Lücking *nom. inval.*, Opuscula Philolichenum 14: 22. 2015.

***Phaeographis spondaica* (Nyl.) Lücking comb. nov.**
Mycobank #811511.

≡ *Thelotrema spondaicum* Nyl., Ann. Sci. Nat., Bot., Sér. 4, 19: 330. 1863. **TYPE:** Cuba, *C. Wright s.n.* (FH!, holotype).
≡ *Leptotrema spondaicum* (Nyl.) Zahlbr., Cat. Lich. Univers. 2: 640. 1923.
≡ *Phaeographis spondaica* (Nyl.) Lücking *nom. inval.*, Opuscula Philolichenum 14: 23. 2015.

= *Graphis lecanographa* Nyl, Flora 52: 123. 1869. **TYPE:** Brazil, 1867, *A. F. M. Glaziou 2014* (H-Nyl 7449!, holotype).
≡ *Graphina lecanographa* (Nyl.) Müller Arg., Flora 63: 41. 1880.
≡ *Phaeographina lecanographa* (Nyl.) Müller Arg., Flora 65: 399. 1882.
≡ *Phaeographis lecanographa* (Nyl.) Staiger, Bibl. Lichenol. 85: 334. 2002.

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Lichens of Eastern North America Exsiccati, Fascicle X, Nos. 446-482.

JAMES C. LENDEMER[1]

ABSTRACT. – Data for the tenth fascicle, comprising the nos. 446 to 482, of *Lichens of Eastern North America Exsiccati* are presented. This fascicle is distributed on exchange from The New York Botanical Garden to B, BG, CANB, CHR, COLO, FH, GZU, H, HMAS, KANU, LD, M, S, TNS, TU, UPS, WIS and hb. Kalb. The primary set has been deposited at NY.

INTRODUCTION

In conjunction with the author's work on the lichen biota of eastern North America he began the distribution *Lichens of Eastern North America Exsiccati* from the Academy of Natural Sciences of Philadelphia (PH). This, the tenth fascicle in the series, is distributed from the New York Botanical Garden (NY) where the author is now employed. This fascicle comprises the nos. 446-482, and is distributed in on exchange to the following herbaria: B, BG, CANB, CHR, COLO, FH, GZU, H, HMAS, KANU, LD, M, S, TNS, TU, UPS, WIS and hb. Kalb. The primary set has been deposited at NY.

FASCICLE X – NOS. 446-482

446. *Caloplaca reptans* Lendemer & Hodkinson
Det. J.C. Lendemer, 2012

ISOTYPE

U.S.A. PENNSYLVANIA. HUNTINGDON CO.: Rothrock State Forest, Colerain Picnic Area, 1 mi NE of village of Spruce Creek, 1.7 mi SW of village of Franklinville, Spruce Creek Twp. – Lat. 40°37'41"N, Long. 78°06'38"W – ca. 700-800 ft. – Hemlock (*Tsuga*) – birch (*Betula*) forest (hemlock dominant) surrounding extensive sandstone talus slope with cold air flow. – On rock.

James C. Lendemer **#11745** 21 April 2008
w/ Bruce Allen, William R. Buck and Richard C. Harris

447. *Lecanora masana* Lendemer & R.C. Harris
Det. J.C. Lendemer, 2011

ISOTYPE

U.S.A. NORTH CAROLINA. HAWYOOD CO.: Great Smoky Mountains National Park, vicinity of Baxter Creek, trail to summit of Mt. Sterling (2 miles to summit). – Lat. 35°42'07"N, Long. 83°07'19"W – 4500-5800 ft. – Spruce-fir-birch forest with sparse hemlock. – On *Abies*.

James C. Lendemer **#11949** 26 April 2008

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448. *Ramalina subleptocarpha* Rundel & Bowler
Det. S.C. Tucker, 2011

U.S.A. CALIFORNIA. SANTA BARBARA CO.: bluffs along footpath from the end of Del Playa Drive toward Coal Oil Point in Isla Vista, ~5 mi W of Santa Barbara. – On *Quercus lobata* (valley oak).

Frank Aiello **#47** 7 May 2011

449. *Ramalina leptocarpha* Tuck.
Det. S.C. Tucker, 2011

U.S.A. CALIFORNIA. SANTA BARBARA CO.: bluffs along footpath from the end of Del Playa Drive toward Coal Oil Point in Isla Vista, ~5 mi W of Santa Barbara. – On *Quercus lobata* (valley oak).

Frank Aiello **#45** 7 May 2011

450. *Pseudocyphellaria aurata* (Ach.) Vain.
Det. J.P. Dey

U.S.A. GEORGIA. RABUN CO.: approximately 12.2 mi W of Calhoun, on U.S. Hwy 76, along ridge top. – Pine forest. – On bark.

Jonathan P. Dey **#13783** August 1981

451. *Caloplaca chrysophthalma* Degel.
Det. M.K. Advaita, 2011

U.S.A. MINNESOTA. WOODBURY CO.: northern edge of Sioux City, Stone State Park. – Lat. 42°33.49′N, Long. 96°28.32′W – ca. 1100 ft. – Deciduous forest (bur oak, hackberry, green ash, black walnut) on steep slopes of the Loess Hill, interspersed with areas of recently burned prairie; scattered mowed shady picnic areas. – On base of fallen 3′dbh roadside hardwood.

M.K. Advaita **#10859** 27 April 2011

452. *Vulpicida canadensis* (Räsänen) J.-E. Mattsson & M.J. Lai
Det. J.C. Lendemer, 2011

U.S.A. OREGON. JEFFERSON CO.: Jack Creek, near Camp Sherman, NW of town of Sisters. – On rotten log.

Jonathan P. Dey **#8945A** 1975

453. *Leptogium lichenoides* (L.) Zahlbr.
Det. J.C. Lendemer, 2011

U.S.A. SOUTH CAROLINA. OCONEE CO.: Sloan Creek Picnic Area, approximately 9 miles south of Cashiers, North Carolina on State Hwy 107 (0.8 miles south of N.C.-S.C. state line) in Sumter National Forest. – 2800 ft. – On rock.

Jonathan P. Dey **#13719** March, 1981

454. *Lepraria harrisiana* Lendemer
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NEW JERSEY. CUMBERLAND CO.: Edward C Bevan / Millville Wildlife Management Area, Buckshutem Swamp, S shore of Buckshutem Stream, 0-0.1 mi E of CR 555, 0.4 mi S of intersection w/ W Buckshutem Rd., S of Millville Municipal Airport, ~3.5 mi SW of Millville. – 39°20′50"N 75°03′47"W – 30 ft. – Atlantic white cedar (*Chamaecyparis thyoides*) swamp with mixed hardwoods (*Acer, Nyssa*). – On *Chamaecyparis*.

James C. Lendemer **#30447** 17 February 2012
w/ Jessica Allen, Brendan P. Hodkinson, Gerry Moore et al.

455. *Micarea prasina* Fr.
Det. R.C. Harris, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. GATES COUNTY: Chowan Swamp Game Land, E shore of the Chowan River, Buck Rd. 0.9 mi NW of Sandbanks Rd. (CR1200), 7 mi N of US 13 in Storys. – 36°31′15"N 76°54′09"W – 7 ft. – Mixed *Quercus nigra-Pinus* bluff forest with occasional mixed hardwoods (*Fagus/Carya*) on bluff edge. – On decorticate log.

Richard C. Harris **#57000** 11 April 2012

456. *Placopsis rhodocarpa* (Nyl.) Nyl.
Det. R.C. Harris, 2012

ECUADOR. PICHINCHA PROVINCE: Volcán Pichincha, E slope, along road to antennas at summit. – 00°10′S 78°35′W – 3200-3700 m. – Roadside páramo and cloud forest. – On soil.

Richard C. Harris **#17050** 14 December 1983

457. *Phyllopsora corallina* (Eschw.) Müll. Arg.
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. CAMDEN COUNTY: North River Game Land, N of Indian Island Rd./Sassafras Lane, 1 mi E of Sandy Hill Rd. – 36°16′20"N 76°01′29"W – 5 ft. – Upland mixed hardwood forest (*Acer, Nyssa, Liquidambar, Quercus, Ilex, Liriodendron*) with wet depressions. – On *Quercus*.

James C. Lendemer **#31254** 15 April 2012
w/ Jessica Allen, Richard C. Harris & Brendan P. Hodkinson

458. *Porina scabrida* R.C. Harris
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. HERTFORD COUNTY: Chowan Swamp Game Land, Parkers Fishery Rd., 0.4 mi S of Meherrin River, E of Potecasi Creek, 2.3 mi N of US158. – 36°25′50"N 76°57′20″W – 0 ft. – *Taxodium* – hardwood (*Acer, Nyssa, Fraxinus*) swamp. – On *Taxodium*.

James C. Lendemer **#30557** 11 April 2012
w/ Jessica Allen, Richard C. Harris & Brendan P. Hodkinson

459. *Lecanora strobilina* (Spreng.) Kieff.
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. VIRGINIA. NORTHAMPTON COUNTY: Magothy Bay Natural Area Preserve, Bulls Drive 1.3 mi E of VA600, 0.2 mi E of Bulls Pond. – 37°08′55"N 75°56′46"W – 4 ft. – Ruderal *Myrica – Pinus – Juniperus* forest. – On *Pinus* log.

James C. Lendemer **#31677** 24 April 2012
w/ Brendan P. Hodkinson

460. *Canoparmelia caroliniana* (Nyl.) Elix & Hale
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. CURRITUCK COUNTY: Currituck Banks North Carolina National Estuarine Research Reserve, W side adjacent to Currituck Sound, 0-1 mi N of terminus of NC12 in Corolla. – 36°23′31"N 75°50′02"W – 0-3 ft. – Maritime forest dominated by *Pinus* and *Quercus laevis*, with additional hardwoods (*Acer, Liquidambar, Myrica, Ilex*) in wet depressions and shoreline. – On *Pinus*.

James C. Lendemer **#31126** 14 April 2012
w/ Jessica Allen, Richard C. Harris and Brendan P. Hodkinson

461. *Arthonia vinosa* Leight.
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. HAYWOOD COUNTY: Great Smoky Mountains National Park, Cataloochee Divide Trail between Double Gap and Purchase Gap. – 35°35′02"N 83°04′39"W to 35°34′19"N 83°06′03"W – *Prunus, Quercus prinus, Betula lenta* upland hardwood ridge top forest edge. – On base of large old *Betula*.

Erin Tripp **#2172** 8 October 2011
w/ Naveed Davoodian, James C. Lendemer, Andrei Moroz and Zev Reuter

462. *Rinodina buckii* Sheard
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. DELAWARE. SUSSEX COUNTY: Redden State Forest, S of East Redden Rd./Rd. 565, 0.1-0.2 mi E of jct w/ Burton Rd. - 38°44′58"N 75°23′40"W – 45 ft. – Mixed hardwood forest (*Ilex, Acer, Nyssa, Liquidambar*). – On *Liquidambar*.

James C. Lendemer **#32129** 27 April 2012
w/ Brendan P. Hodkinson

463. *Parmeliopsis subambigua* (Gyeln.) Gyeln.
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. GATES COUNTY: Chowan Swamp Game Land, Dowry/Tinkham Rd. ~1 mi W of Sandbanks Rd. (CR1200), E shore of the Chowan River, ~3 mi N of US13 in Storys. – 36°28′18"N 76°55′56"W – 11 ft. – Mixed *Quercus* – *Pinus* bluff forest with adjacent riparian *Nyssa-Taxodium* forest. – On *Pinus*.

James C. Lendemer **#30688** 11 April 2012
w/ Jessica Allen, Richard C. Harris and Brendan P. Hodkinson

464. *Arthothelium spectabile* A. Massal.
Det. J.C. Lendemer, 2012

UNITED STATES OF AMERICA. NORTH CAROLINA. HAYWOOD COUNTY: Great Smoky Mountains National Park, Cataloochee Divide Trail between Double Gap and Purchase Gap. – 35°35′02"N 83°04′39"W to 35°34′19"N 83°06′03"W – *Prunus, Quercus prinus, Betula lenta* upland hardwood ridge top forest edge. – On dead *Aesculus*.

Erin Tripp **#2175** 8 October 2011
w/ Naveed Davoodian, James C. Lendemer, Andrei Moroz and Zev Reuter

465. *Arthonia kermesina* R.C. Harris & Lendemer
Det. J.C. Lendemer, 2011

ISOTYPE

U.S.A. NORTH CAROLINA. SWAIN CO.: Great Smoky Mountains National Park, Appalachian Trail between Clingmans Dome and jct w/ Goshen Prong Trail. – 35°33′45"N 83°29′58"W to 35°33′54"N 83°31′44"W – 5800-6600 ft. – *Picea-Abies* forest with northern hardwoods (*Betula, Acer spicatum*) at lower elevations. – On rough bark of lone old *Picea*.

James C. Lendemer **#29722** 25 June 2011
w/ Naveed Davoodian

466. *Lepraria friabilis* Lendemer, Knudsen & Elix
Det. J.C. Lendemer, 2010

UNITED STATES OF AMERICA. GEORGIA. TATTNALL COUNTY.: Big Hammock Natural Area, 0.25 mi W of parking area on CR441, ~1 mi E of jct of CR 441 & GA 121/144/169. – Lat. 31°52′00"N, Long. 82°04′00"W – *Taxodium-Nyssa-Acer* swamp. – On *Taxodium*.

James C. Lendemer **#21369** 20 December 2009
w/ Sean Q. Beeching

467. *Lobaria oregana* (Tuck.) Müll. Arg.
Det. J.C. Lendemer, 2013

UNITED STATES OF AMERICA. OREGON. MARION COUNTY: at Fisherman's Bend Park, two miles west of Miles City on State Hwy 22.

Jonathan P. Dey **#8821** 1975

468. *Micarea chlorosticta* (Tuck.) R.C. Harris
Det. J.C. Lendemer, 2013

UNITED STATES OF AMERICA. NORTH CAROLINA. DARE COUNTY: Alligator River National Recreation Area, W of Milltail Rd., 0.4 mi N of bridge at Milltail Creek, 6 mi S of jct w/ US64. – 35°48′01"N 75°52′59"W – elev. 2 ft – *Chamaecyparis-Taxodium* swamp with *Lyonia-Ilex glabra* understory and sparse *Acer-Nyssa*. – On *Chamaecyparis*.

James C. Lendemer **#34277** 9 December 2012
w/ William R. Buck, Richard C. Harris, Blanka Shaw and Jon Shaw

469. *Cresponea flava* (Vain.) Egea & Torrente
Det. J.C. Lendemer, 2013

UNITED STATES OF AMERICA. NORTH CAROLINA. JONES COUNTY: Croatan National Forest, FS134/Holston Hunter Rd. at Holston Creek, just W of jct of FS 203 & FS107. – 34°50′49"N 77°07′53"W – elev. 20-25 ft. – Swamp forest of mixed *Taxodium* and hardwoods (*Acer, Persea, Quercus, Myrica, Ilex, Nyssa, Liquidambar*) with *Sabal minor*. – On large *Taxodium*.

James C. Lendemer **#35151** 5 March 2013
w/ Patrick Dalton and Lane Gibbons

470. *Phaeocalicium curtisii* (Tuck.) Tibell
Det. R.C. Harris, 2012

UNITED STATES OF AMERICA. NEW YORK. JEFFERSON COUNTY: Chaumont Barrens Preserve, W of Van Alstyne Road, 1.3 mi N of Morris Track Road (Co. Rd. 125), 3 mi NE of NY 12E. – 44°05′52"N 76°05′25"W – Moist, wooded alvar. – On branches of *Rhus typhina*.

William R. Buck **#58257** 24 September 2011

471. *Gassicurtia acidobaeomyceta* Marbach
Det. J.C. Lendemer, 2013

UNITED STATES OF AMERICA. NORTH CAROLINA. DARE COUNTY: Buxton Woods Coastal Reserve, SW of terminus of Old Doctor Rd., W of Lookout Loop Trail. – 35°15′13"N 75°33′38"W – elev. 9 ft. – Sand ridge-swale complex with maritime forest of *Pinus* and mixed hardwoods (*Ilex, Persea, Acer, Quercus*). – On *Ilex vomitoria*.

James C. Lendemer **#35869** 18 March 2013

472. *Phaeographis oricola* Lendemer & R.C. Harris
Det. J.C. Lendemer, 2013

ISOTYPE

UNITED STATES OF AMERICA. NORTH CAROLINA. DARE COUNTY: Buxton Woods Coastal Reserve, SE of jct of Great Ridge Rd. and Water Association Rd., E of West Trail. – 35°14′51"N 75°34′57"W – elev. 5 ft. – Sand ridge-swale complex with maritime forest of *Pinus* and mixed hardwoods (*Quercus, Ilex, Carpinus, Persea*). – On *Ilex vomitoria*.

James C. Lendemer **#36066** 18 March 2013

473. *Phaeocalicium populneum* (Brond. *ex* Duby) A.F.W. Schmidt
Det. D. Ladd, 2013

UNITED STATES OF AMERICA. ALASKA. BOROUGH OF SKAGWAY: Ca. 1 mile north/northeast of downtown Skagway, on southeast-facing slope north of Dyea Road, ca. 2.0 miles southwest of junction with Klondike Highway (Rt. 2). – 59.476°N 135.300°W – Mossy secondary forest on steep slope with *Picea sitchensis, Betula papyrifera, Populus balsamifera trichocarpa, Pinus contorta, Alnus rubra*; siliceous outcrops and large boulders common. – On lightly shaded twigs of *Populus balsamifera trichocarpa*.

Douglas Ladd **#32580** 18 August 2013

474. *Parmeliella triptophylla* (Anzi) Müll. Arg.
Det. J.C. Lendemer, 2013

CANADA. QUEBEC. MRC DE LA HAUTE-GASPÉSIE: Parc national de la Gaspésie, Sentier de la Grande Traversée Ouest, from parking area for Chute Sainte-Anne to ~1.5 km along Rivère Sainte-Anne. – 48°55′08"N 66°07′09"W – 250 m. – Old growth *Thuja* forest with accessory *Picea-Abies* and *Alnus*, along riparian corridor and with non-calcareous rock outcrops. – On *Thuja*.

James C. Lendemer **#32720** 4 July 2012

475. *Opegrapha viridis* (Ach.) Behlen & Desberger
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. NORTH CAROLINA. ONSLOW COUNTY: White Oak River Game Land, Quantenary Tract, along unnamed road 1.1 mi NE of Belgrade-Swansboro Rd. (CR 3), just S of Morton Fork. – 34°49′50"N 77°12′54"W – 23 ft. – Ruderal forest of planted *Pinus* and mixed hardwoods (*Acer, Quercus, Carya, Liriodendron, Liquidambar, Carpinus*). – On *Liriodendron*.

James C. Lendemer **#39172** 28 October 2013
w/ William Buck, Patrick Dalton, Richard Harris & Motito Angel

476. *Agyrium rufum* (Pers.) Fr.
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. NORTH CAROLINA. ONSLOW COUNTY: Hammocks Beach State Park, NE end of Huggins Island. – 34°40′23"N 77°06′55"W – 5-10 ft. – Maritime forest of *Pinus*, *Juniperus* and mixed hardwoods (*Celtis, Ilex vomitoria, Magnolia virginiana*). – On *Juniperus* wood.

James C. Lendemer **#38700** 25 October 2013
w/ William Buck, Patrick Dalton, Richard Harris & Motito Angel

477. *Melaspilea tribulodes* (Tuck.) Müll. Arg.
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. NORTH CAROLINA. DARE COUNTY: Cape Hatteras National Seashore, trail from World War II Memorial, 0.5 mi W of Lighthouse Rd. – 35°14′55"N 75°32′39"W – 10 ft. – Oak (*Quercus virginiana, Q. illicifolia*) – *Pinus* scrub with *Ilex vomitoria, Myrica, Persea* and *Sabal minor*. – On *Pyrenula cruenta* on *Myrica*.

James C. Lendemer **#43186** 24 March 2014
w/ participants of the 2014 Tuckerman Workshop

478. *Fissurina illiterata* (R.C. Harris) Lendemer
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. NORTH CAROLINA. HYDE COUNTY: Alligator River National Wildlife Refuge, Chip Rd. 3.2 mi S of jct w/ Whipping Creek Rd., W of S end of Swan Creek Lake. – 35°37′50"N 75°59′15"W – 1 ft. – Mature hardwood (*Acer, Nyssa, Magnolia virginiana, Persea*) – *Taxodium* forest with *Ilex glabra* and *Cyrilla* understory. – On *Myrica*.

James C. Lendemer **#43199** 24 March 2014
w/ Jessica Allen, R. Troy McMullin and Erin Tripp

479. *Fissurina incrustans* Fée
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. NORTH CAROLINA. DARE COUNTY: Alligator River National Wildlife Refuge, SE of jct of Spring Rd. and Navy Shell Rd., 1.1 mi SE of jct w/ Navy Shell Rd. and Milltail Rd. – 35°46′13"N 75°53′07"W – 1 ft. – Mature mixed hardwood (*Nyssa, Acer, Magnolia virginiana, Persea*) and conifer (*Chamaecyparis, Taxodium, Pinus*) forest with *Lyonia-Ilex glabra* understory. – On large *Nyssa.*

James C. Lendemer **#42934**	21 March 2014
w/ participants of the 2014 Tuckerman Workshop	

480. *Pyrenula citriformis* R.C. Harris
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. NORTH CAROLINA. HYDE COUNTY: Alligator River National Wildlife Refuge, Chip Rd. 2 mi SW of jct w/ Whipping Creek Rd. – 35°38′40"N 75°58′42"W – 2 ft. – Pocosin dominated by *Pinus* and *Gordonia*, with sparse *Acer* and *Magnolia virginiana*, understory of *Cyrilla, Ilex glabra* and *Persea*. – On *Ilex glabra.*

James C. Lendemer **#43125**	23 March 2014
w/ participants of the 2014 Tuckerman Workshop	

481. *Bactrospora carolinensis* (Ellis & Everh.) R.C. Harris
Det. J.C. Lendemer, 2014

UNITED STATES OF AMERICA. SOUTH CAROLINA. BERKELEY COUNTY: Francis Marion National Forest, Guilliard Lake Scenic Area, E of Gravel Run, W of FS 150-G, 0.5 mi S of terminus at Guilliard Lake and 0.3 mi SW of jct w/ FS 190. – 33°16′53"N 79°37′28"W – 67 ft. – Upland mixed hardwood (*Acer, Quercus, Liquidambar, Ilex opaca, I. laevigata, Myrica*) and *Pinus* forest. – On *Liquidambar.*

James C. Lendemer **#41439**	6 December 2013
w/ Jessica Allen, William R. Buck and Richard C. Harris	

482. *Lecidea cruciaria* Tuck.
Det. K. Knudsen, 2014

UNITED STATES OF AMERICA. CALIFORNIA. SAN LUIS OBISPO COUNTY: Central Coast, Irish Hills, ridge above Coon Creek. – 36°14′19.7"N 120°51′26.3"W – 984 ft. – Coastal sage shrubs. – Abundant on exposed slab of Monterey shale.

Kerry Knudsen **#16469**	14 April 2014
w/ Michael Walgren	

ACKNOWLEDGEMENTS

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Lichenes Exsiccati Magnicamporum Fascicle 1, with comments on selected taxa

CALEB MORSE[1] & DOUGLAS LADD[2]

ABSTRACT. – Data are provided for the first 50 numbers of a series exemplifying the lichen biota of the Great Plains of central North America. The set includes two isotypes, duplicates of one paratype, and several rare or regionally restricted taxa. Detailed discussions, images, specimen data, and range maps are provided for three taxa of note: *Graphis sophisticascens*, *Lecania constricta*, and *Monoblastiopsis nigrocortina.*

INTRODUCTION

In conjunction with floristic studies of the lichens of the Central Grasslands of North America, the authors have assembled exsiccati of representative taxa from the region. Enumerated here are the first 50 numbers distributed by the R.L. McGregor Herbarium (KANU) as Fascicle 1 of *Lichenes Exsiccati Magnicamporum*. Complete sets have been sent as gifts to BG, BR, BRY, CANL, COLO, F, FH, GZU, H, Herb. Essl., Herb. Ladd, MIN, MSC, NY, OMA, OSC, PRA, and UCR. The primary set has been deposited at KANU.

Extending from northern Mexico into southern Canada, the Great Plains of North America can be broadly characterized as the rolling uplands east of the Rocky Mountains and west of the eastern woodland biomes (see, for instance, Barbour & Christensen 1993). This vast region, covering nearly 1.5 million km^2, encompasses one of the largest grassland landscapes in the world, including shortgrass, mid-grass, and most of the tallgrass prairie region, as well as the Cross Timbers, Black Hills, and northern shrub-steppe regions (The Nature Conservancy 2007; and fig. 1 herein). This area has received little attention or study from lichenologists, despite the extent and diversity of its habitats and substrates.

Our objective in assembling this series is to exemplify the lichen biota of the Great Plains with special emphasis on taxa that are unusual or poorly known outside the region. Fascicle 1 includes 50 specimens representing 44 taxa from 43 collection sites in Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Wyoming (Fig. 2). Included in Fascicle 1 are isotypes of *Fellhanera crucitignorum* C.A. Morse & Ladd (Morse & Ladd 2013) and *Hyperphyscia confusa* Essl., C.A. Morse & S. Leavitt (Esslinger et al. 2012), duplicates of a paratype of *Caloplaca lignicola* Wetmore (Wetmore 2009), as well as several rarely collected or regionally endemic species. The Great Plains circumscription and distribution of *Lecanora pallidochlorina* T.H. Nash, B.D. Ryan & Lumbsch has been treated by Ladd and Morse (2012) and that of *Caloplaca ulcerosa* Coppins & P. James has been discussed by Wetmore (2009). Three additional species included Fascicle 1 warrant comment and are discussed below.

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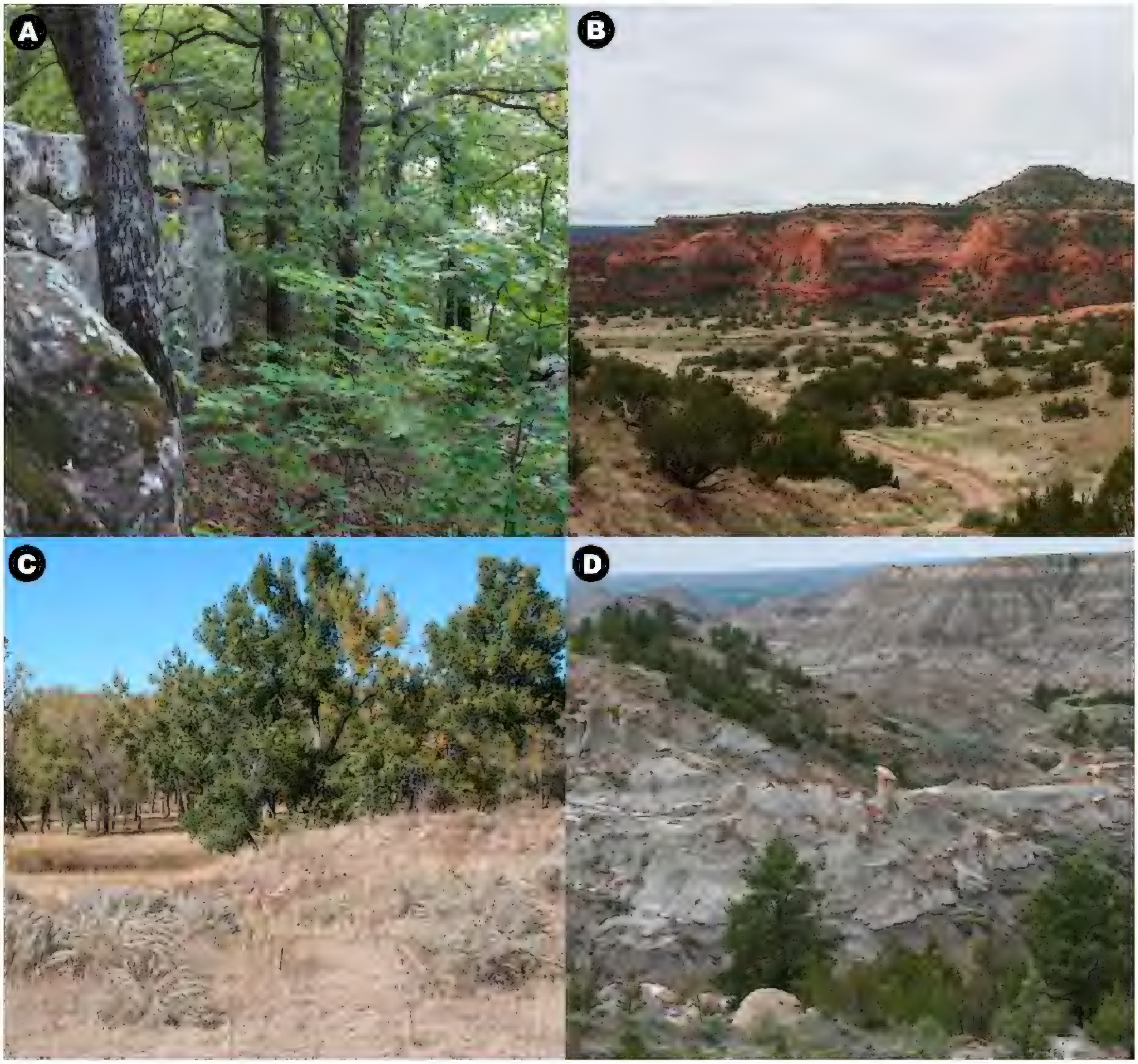

Figure 1. Some habitats typical of the Great Plains. A, sandstone cliffs in Cross Timbers forest, Okmulgee State Park, Okmulgee Co., Oklahoma (*Lich. Exs. Magnicamporum 14*; photo: Katherine J. Morse); B, juniper woodland and shortgrass prairie, Purgatoire Canyon, Comanche National Grasslands, Las Animas Co., Colorado (*Lich. Exs. Magnicamporum 43*); C, sandsage prairie and cottonwood-willow woodland along Arikaree River, TNC Fox Ranch, Yuma Co., Colorado (*Lich. Exs. Magnicamporum31 & 34*); D, ponderosa pine-juniper woodlands and eroded badlands, Makoshika State Park, Dawson Co., Montana (*Lich. Exs. Magnicamporum 20 & 21*).

MATERIALS AND METHODS

All specimens cited in comments and/or distributed as part of *Lich. Exs. Magnicamporum* Fascicle 1 were examined by one or both authors; selected specimens were confirmed by specialists. Specimens were subjected to chemical analysis using standard spot tests (Brodo et al. 2001) or Thin Layer Chromatography (TLC). TLC was conducted using solvent systems A, C, and sometimes B′, following the methods of Orange et al. (2001). Measurements were made from sections mounted in water, and are presented as a simple range or, where sufficient material allowed, as the average ($\bar{x}$) +/- one standard deviation (SD), bounded by the smallest and largest observed values, and followed by the sample size (n) (i.e., (smallest observed) $\bar{x}$-1SD – $\bar{x}$ – $\bar{x}$+1SD (largest observed) [*n*]).

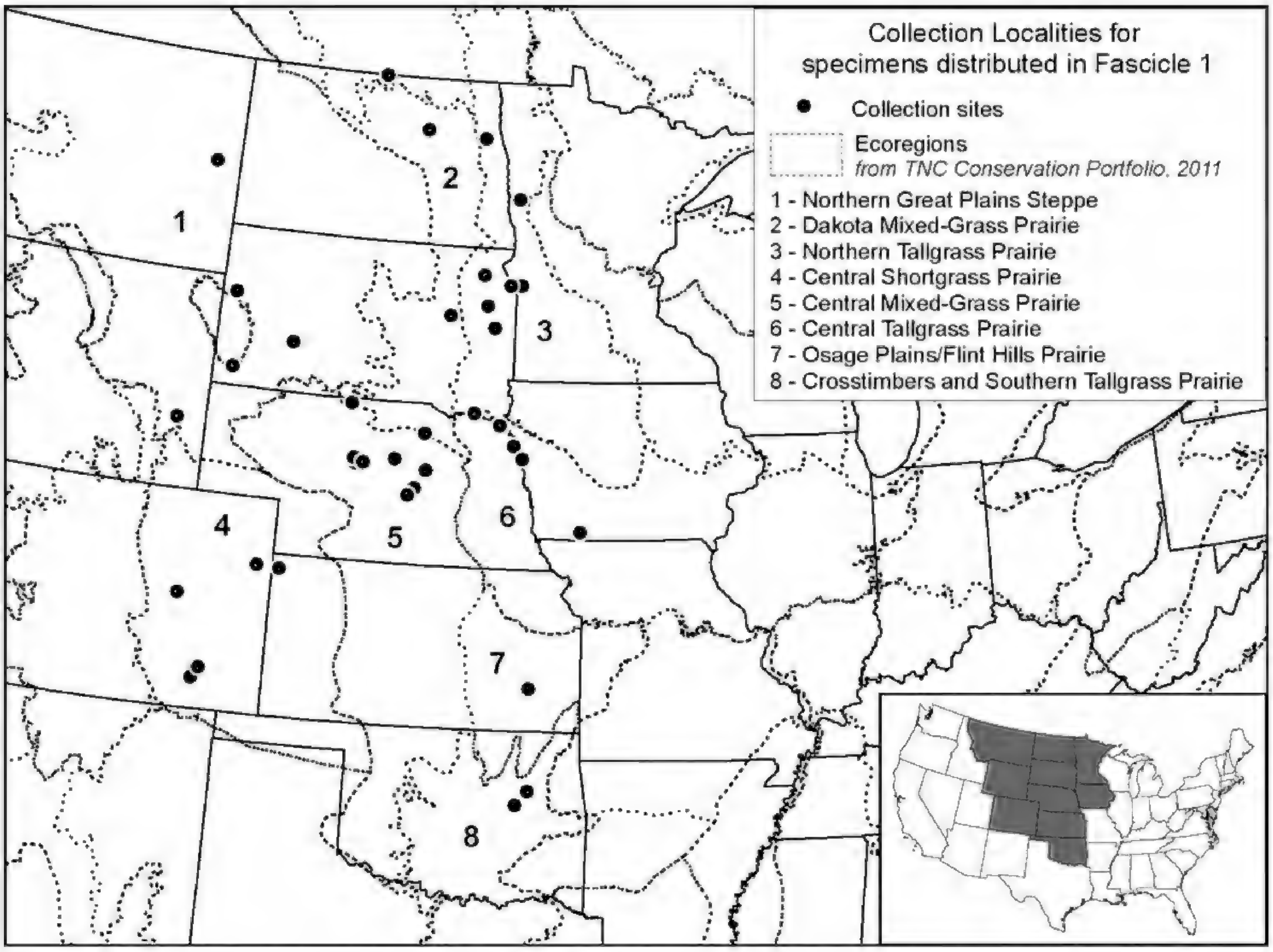
Collection Localities for specimens distributed in Fascicle 1
● Collection sites
Ecoregions from TNC Conservation Portfolio, 2011
1 - Northern Great Plains Steppe
2 - Dakota Mixed-Grass Prairie
3 - Northern Tallgrass Prairie
4 - Central Shortgrass Prairie
5 - Central Mixed-Grass Prairie
6 - Central Tallgrass Prairie
7 - Osage Plains/Flint Hills Prairie
8 - Crosstimbers and Southern Tallgrass Prairie
1
2
3
4
5
6
7
8

Figure 2. Collection localities for specimens distributed as Fascicle 1 of *Lichenes Exsiccati Magnicamporum.*

COMMENTS ON SELECTED SPECIES

***Graphis sophisticascens* Nyl.**, Lich. Japon. 108. 1890.

FIGURES 3, 4A, AND 4B.

Description. — Thallus thin, continuous, sublustrous, pale grey to pale sordid or greenish grey, sometimes with a localized narrow band (ca. 0.2 mm) of thin white prothallus; lirellae common, scattered, initially immersed, becoming erumpent, straight to more commonly curved, sinuous, or C-shaped, simple or occasionally with a short branch, to 0.8 (1.7) mm long and 0.15 mm wide, with lustrous, rounded, non-striate black labia; disk exposed, typically as a narrow flat slit, but often with a small portion more broadly exposed (to 0.9 mm broad), covered with fine white pruina; exciple lateral, black, carbonaceous; epithecium brown, the paraphyses with expanded pigmented apices; hypothecium pale to pale yellowish brown; ascospores 8, persistently pale, rotund to bluntly quadrate, (17)20(23) × (8.5)9–11(12.5) µm, initially with (3)4(5) lenticular cells, most or all of the cells becoming longitudinally once-divided into rounded cells, I+ as noted by Nylander.

COMMENTS. – This species was described in Nylander's *Lichenes Japoniae* (1890), based on a collection from Missouri attributed to William Wirt Calkins. The name is based on an undated, unattributed collection at H-NYL (Lücking et al. 2009). The holotype is on *Betula nigra*, with only "39. *Graphis* on *Populus* Missouri", in Calkins' hand, as the label data, and, in different ink and penmanship, an illustration of a spore and the notation "I+ 20–25 10–15". These measurements correspond to the ascospore sizes given by Nylander in the type description and are likely in Nylander's hand. As far as we can determine, Calkins never collected in Missouri. A possible scenario was that the specimen, collected and submitted by Charles Hermann Demetrio to Calkins, was forwarded to Nylander, perhaps through John Wiegand Eckfeldt.

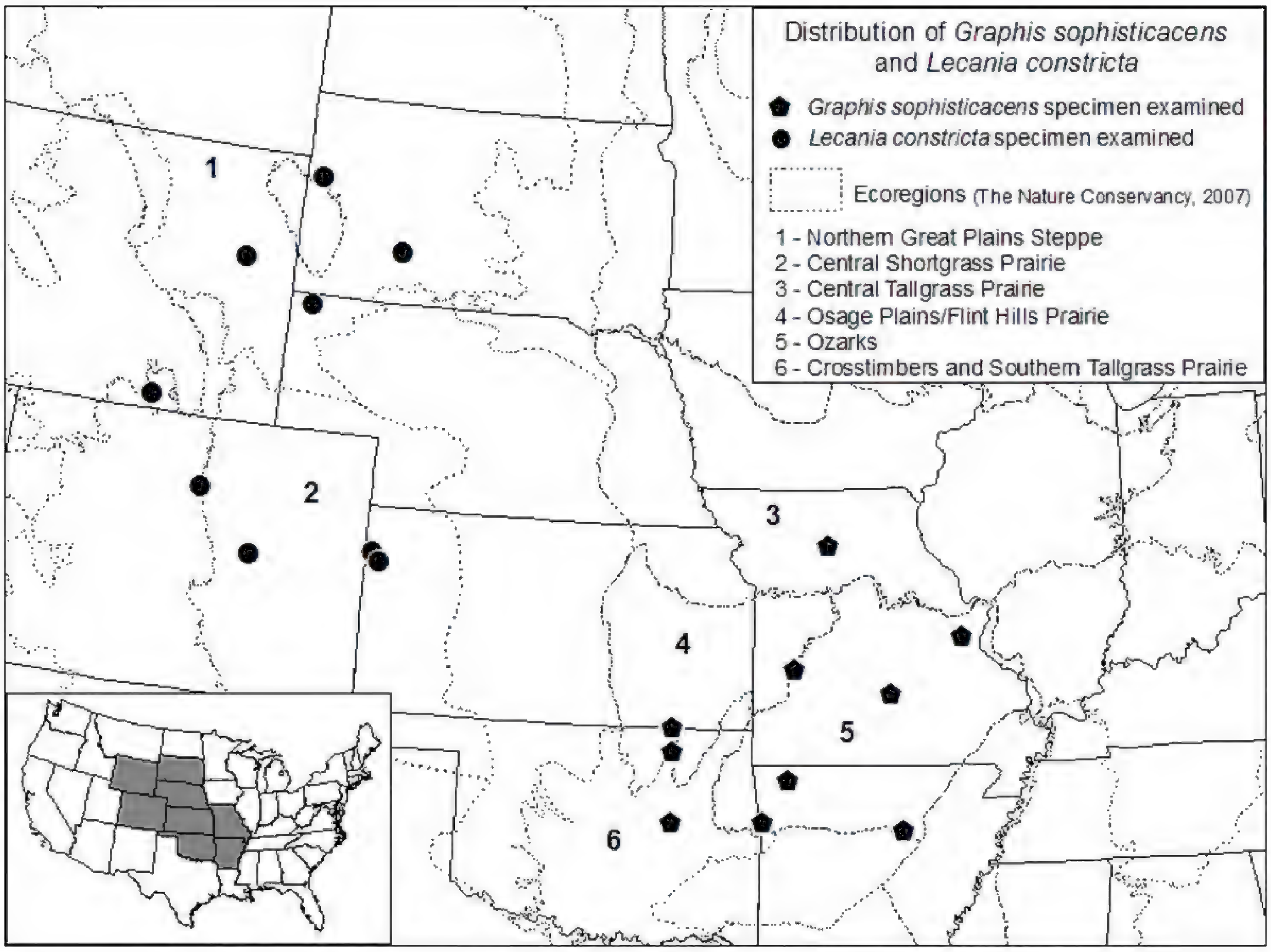
Distribution of Graphis sophisticacens and Lecania constricta
Graphis sophisticacens specimen examined
Lecania constricta specimen examined
Ecoregions (The Nature Conservancy, 2007)
1 - Northern Great Plains Steppe
2 - Central Shortgrass Prairie
3 - Central Tallgrass Prairie
4 - Osage Plains/Flint Hills Prairie
5 - Ozarks
6 - Crosstimbers and Southern Tallgrass Prairie
1
2
3
4
5
6

Figure 3. Known distribution of *Graphis sophisticascens* (hexagons) and *Lecania constricta* (circles).

Several other early collections exist, all unattributed or collected by Demetrio, and all likely collected by him in the same general area in the 1890's. Two undated, unattributed specimens bear the same recording error with regard to substrate as the holotype, and are possible isotypes: 1) a specimen at MICH (62801) with a note in Bruce Fink's hand "On poplar bark, from Missouri, comm. Eckfeldt, collector unknown"; 2) a specimen in F (C0068905F), with a type-written label marked "W.W. Calkins' N. Am. Lichens" and "Mo. -- super corticem populi n. sp." The remainder of the specimens with substrate and locality data are attributed to "birch" or "*Betula nigra*" in the vicinity of Emma, Missouri, sometimes with additional locality data of Davis Creek, a small creek north of Emma. These include an 1894 Demetrio collection (FH 437415) with a label indicating possible distribution as part of the C. Baenitz *Herbarium Americanum*, an undated Demetrio collection at PH from the Eckfeldt herbarium, identified by R.C. Harris as an isotype (PH 7591), an 1891 Demetrio collection (MICH 10450, BG 62997), an 1893 Demetrio collection (MIN 660727), and an 1897 Demetrio collection (UC 1941945).

Emma and nearby Davis Creek span the Lafayette/Saline county line, approximately 55 miles east of Kansas City. These specimens remained the only known collections for the next 96 years, until the species was rediscovered in southwestern Missouri in 1993. Since then, disciplined surveys of mature stands of *Betula nigra* along streams in the Interior Highlands and southern Great Plains have revealed several other populations.

Nylander's (1890) brief description of the species characterized it as similar to his *Graphis sophistica* Nyl. (a European species considered by Lücking et al. (2009) to be synonymous with the Neotropical *G. platycarpa* Eschw.), but with more open lirellae and smaller, slightly inflated ascospores with four transverse septa, each with one longitudinal septum. The species falls in Group 5 of Lücking et al. (2009), who note its similarity to *G. tenuirima* (Shirley) A.W. Archer, a Paleotropical species described as having larger ascospores and more thinly pruinose disks.

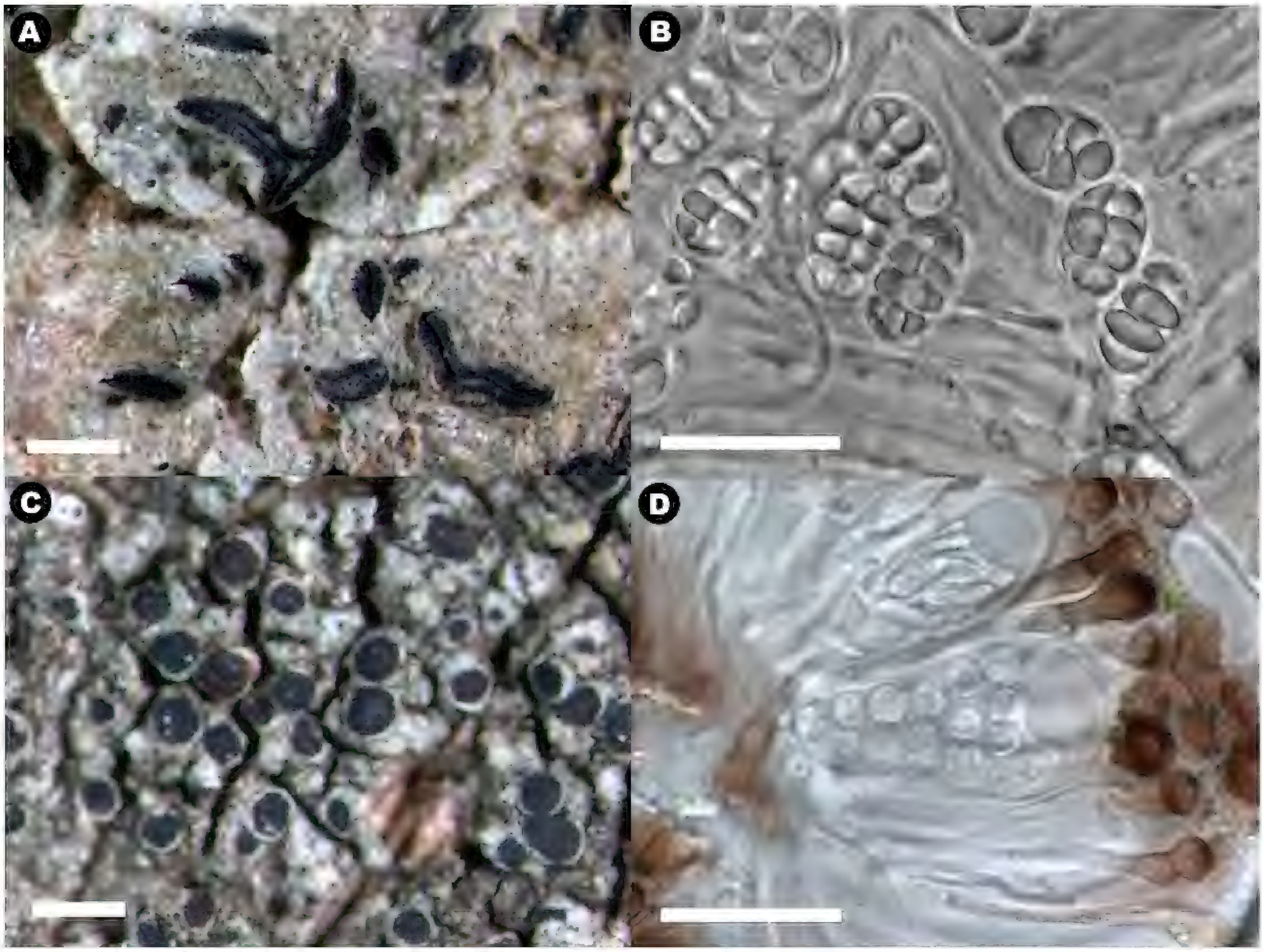

Figure 4. A–B, *Graphis sophisticascens*. A, thallus (scale = 0.5 mm); B, spores 1000× (scale = 20 µm). C–D, *Lecania constricta*. C, thallus (scale = 0.5 mm), D, ascus with mature spores and paraphyses.

Graphis sophisticascens is known to occur only on *Betula nigra*. The host tree is widely distributed throughout the eastern United States, ranging from the Texas Gulf coast through northern Florida, northwards to southern Minnesota, Wisconsin, and New England, so it is possible that the range of *G. sophisticascens* is broader than currently documented. We hope distribution of this series catalyzes more surveys of *Betula nigra* throughout its range.

Graphis scripta (L.) Ach. is common throughout the region and in the field closely resembles *G. sophisticascens*; it occurs occasionally on *Betula nigra*. The two taxa are easily separated by ascospore characteristics — narrow and elongate, with 6 or more lenticular cells in *G. scripta* and broadly rotund to quadrate, muriform to submuriform, with rounded cells typically appearing in section as 4(5) × 2 celled in *G. sophisticascens*. *Graphis scripta* tends to have slightly less erumpent lirellae with narrower labia, and the disk is more uniformly and narrowly exposed, whereas *G. sophisticascens* tends to have more prominent, slightly broader labia and portions of the disks more broadly exposed, but these characters are subtle and there is much overlap. Additionally, when *G. scripta* occurs on friable-barked species of *Betula*, including *B. nigra*, the lirellae typically display a strong parallel alignment with the bark fibers, whereas lirellae of *G. sophisticascens* do not show this directional proclivity.

Bark of *Betula nigra* is also commonly inhabited by several taxa nonlichenized fungi traditionally attributed to the family Hysteriaceae s.l. All of these taxa lack evident thalli and have black lirellae. Most common among these is *Hysterium angustatum* Pers., with short, inflated lirellae and brown, 4-celled ascospores.

***Specimens examined.* — U.S.A. ARKANSAS.** BENTON CO.: War Eagle Mill, on lower bole of massive *Betula nigra* along War Eagle Creek, 16.x.2005, *D. Ladd 27552* (hb. Ladd, MIN-889515), *J.C. Lendemer 5177* (NY-00753088, PH-00117455). CLEBURNE CO.: Big Creek Natural Area, on shaded boles of *B. nigra* along stream, 7.x.2010, *D. Ladd 31513 & J.C. Lendemer* (hb. Ladd), *D. Ladd, 31514 &*

J.C. Lendemer (hb. Ladd), *J.C. Lendemer 26318 & D. Ladd* (NY-01219160), *J.C. Lendemer 26358 & D. Ladd* (NY-01219135), *J.C. Lendemer 26382 & D. Ladd* (NY-01219111). CRAWFORD CO.: Ozark National Forest, at Natural Dam along Mountain Fork, on *B. nigra*, 15.iv.2004, *R.C. Harris 49098* (NY-00690652), *R.C. Harris 49117* (NY-00690664). **KANSAS.** CHAUTAUQUA CO.: 2.25 mi S of Niotaze, along Birch Creek, E from Rd 29 crossing 0.1 mi N inters of Rd 29 & Cowboy, on large *B. nigra*, 18.ix.2007, *C.A. Morse 15699* (KANU-376968, and duplicates distributed as *Lich. Exs. Eastern N. Amer. 302*). **MISSOURI.** JEFFERSON CO.: LaBarque Creek Conservation area, on 7" DBH *B. nigra* on wooded floodplain, 23.iii.2012, *D. Ladd 32257 & Mike Arduser* (hb. Ladd). LINN CO.: Pershing State Park, on lower trunk of large dead *B. nigra* in dying, silt-choked low woodland along Locust Creek, 16.v.2013, *D. Ladd 32550* (hb. Ladd). ST. CLAIR CO.: Low woodland along Allen Branch, 2 miles northwest of junction of highways K and 54, on shaded bole of *B. nigra*, 24.x.1993, *D. Ladd 17747* (hb. Ladd). TEXAS CO.: Mark Twain National Forest, Slabtown Access on Big Piney River, 5.xi.2004, *R.C. Harris 50428* (NY-00721893). **OKLAHOMA.** OKMULGEE CO.: 0.5 mi N, 5.5 mi W of jct of US hwys 62 & 75 on S side of Okmulgee, just inside NE entrance to Okmulgee State Park, along S side of park rd just W jct with OK Hwy 56, elev. 640 ft, on *B. nigra*, 06.ix.2009. *C.A. Morse 20170 & K. Logan* (KANU-385274, and duplicates distributed as *Lich. Exs. Magnicamporum 14*). OSAGE CO.: 7.5 mi N, 3.75 mi E Barnsdall, Woolaroc Wildlife Preserve: just W of Little Rock Creek, N of outlet of Clyde Lake, elev. 780–850 ft, on 20 inch dbh *B. nigra*, 07.iv.2007, *C.A. Morse 14791a & D. Ladd* (KANU-386597).

***Lecania constricta* W.A. Weber.**, Lichenes exsiccati, distributed by the University of Colorado Museum, Fasc. 16, No. 601–640, [p. 6]. 1984.

FIGURES 3, 4C, AND 4D.

COMMENTS. – The type of this species was distributed as *Lich. Exs. COLO 614*; see Weber (1984) for a Latin description. *Lecania constricta* shares with several congeners (i.e., the *L. polycycla* group of Mayrhofer (1988)) medially constricted, 1-septate ascospores with rounded ends, and paraphyses that are easily separable in water, with markedly expanded apices that have both internal and external pigmentation. The species is corticolous on *Populus angustifolia*, *P. deltoides*, *P. tremuloides*, and *Ulmus pumila*, and produces an ashy grey thallus and prominent, somewhat irregularly thickened thalline apothecial margins. Ascospores were reported by Weber (1984) to be 9–11 × 4–5 µm, and found in our study to be 8–11.5(–13.4) × 3–5.5(–7.3) µm. The specimens *Morse 18117* and *Morse 19810* were found to have no lichen substances by TLC.

Lecania constricta was previously known from the type collection in Colorado and a second site in Wyoming. The species is here reported from new localities in Colorado, Kansas, Nebraska, South Dakota, and Wyoming — a distribution pattern that suggests the species may be endemic or near-endemic to the High Plains.

Other members of the *Lecania polycycla* group reported from North America include the saxicolous species *L. flavescens* Lynge and *L. polycycla* (Anzi) Lettau. *Lecania flavescens*, documented in North America from a few localities in Nunavat Territory, Canada (Thomson 1997), produces a yellow, ochre, grey-brown, or dark brown thallus (Mayrhofer 1988, Thomson 1997) and slightly broader ascospores, (5)6–7.5 µm (*fide* Mayrhofer 1988). *Lecania polycycla*, documented in North America from a small number of specimens in Arizona, California, and Nevada (Knudsen 2005, van den Boom & Ryan 2004) produces a gray, brownish, greenish, or black thallus (Mayrhofer 1988, van den Boom & Ryan 2004) and lower hymenium (*fide* van den Boom & Ryan 2004). Another corticolous member of the *L. polycycla* group, *L. sipmanii* Van den Boom & Zedda, described from Syria in van den Boom and Zedda (2000), has not been reported for North America. *Lecania sipmanii* has not been examined by the authors and van den Boom and Zedda (2000) did not provide explicit comparisons between *L. sipmanii* and *L. constricta*. However, *L. sipmanii* is reported to produce fine hairs over the cortex and thalline margins, as well as slightly smaller apothecia and slightly larger spores. The epihymenium of *L. sipmanii* was reported as to be KOH– by van den Boom and Zedda (2000); the epihymenium of all specimens of *L. constricta* examined here is distinctly KOH+ purplish.

***Specimens examined.* — U.S.A. COLORADO.** BOULDER CO.: outer foothills of the Front Range, "The Flatirons", on SW edge of City of Boulder, in shallow gulch just S of mouth of Gregory Canyon, elev. 1600 m, dominant on bark of *Populus angustifolia*, 5.ix.1981, *W.A. Weber et al. s.n.* (COLO L-76065, holotype, and isotypes distributed as *Lich. Exs. COLO 614*). EL PASO CO.: 1.5 mi S, 2.5 mi W

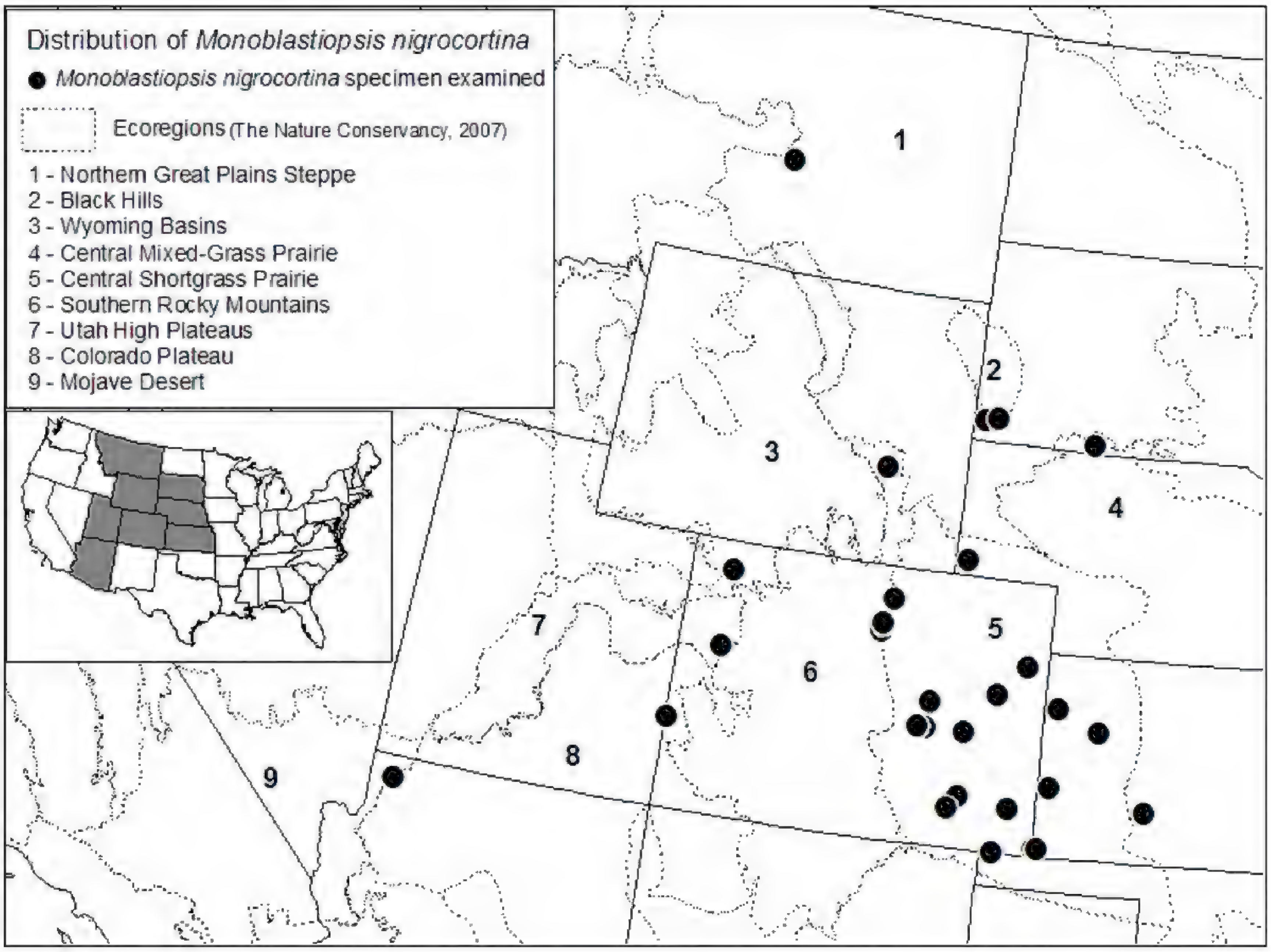
Distribution of Monoblastiopsis nigrocortina
● Monoblastiopsis nigrocortina specimen examined
Ecoregions (The Nature Conservancy, 2007)
1 - Northern Great Plains Steppe
2 - Black Hills
3 - Wyoming Basins
4 - Central Mixed-Grass Prairie
5 - Central Shortgrass Prairie
6 - Southern Rocky Mountains
7 - Utah High Plateaus
8 - Colorado Plateau
9 - Mojave Desert
1
2
3
4
5
6
7
8
9

Figure 5. Known distribution of *Monoblastiopsis nigrocortina*.

Ramah, Ramah Reservoir State Wildlife Area: W and N side, elev. 6180–6240 ft, on *P. deltoides*, 04.x.2007, *C.A. Morse 15818a* (KANU-382256). **KANSAS.** SHERMAN CO.: 10 mi S, 2 mi W jct of KS Hwy 27 & US Hwy Business 24 in Goodland, Soldiers Memorial Park: Smoky Gardens, elev. 3610 ft, on *P. deltoides*, 27.vi.2007, *C.A. Morse 15589b & J. Elliott* (KANU-378804); 0.75 mi S, 0.75 mi W of Ruleton, Goodland State Travel Information Center and rest stop along S side of Interstate 70, elev. 3830 ft, on *Ulmus pumila*, 1.xi.2008, *C.A. Morse 18117* (KANU-378672). **NEBRASKA**. SIOUX CO.: ca. 11–12 mi N, 8–9 mi W of Crawford, Oglala National Grassland: Toadstool Geological Park and vicinity, elev. 3740–4020 ft, on *P. deltoides* in wash, 01.vii.2010, *C.A. Morse 21235* (KANU-387109, KANU-387110, KANU-387111). **SOUTH DAKOTA.** BUTTE CO.: 2 mi N, 7.5 mi E of jct of US hwys 85 & 212 in Belle Fourche, W side Belle Fourche Reservoir: Rocky Point Recreation Area, around Group Camp B, elev. 2975 ft, on *P. deltoides*, 12.vii.2009, *C.A. Morse 19810* (KANU-381311, KANU-381312, and duplicates distributed as *Lich. Exs. Magnicamporum 22*). JACKSON CO.: Badlands National Park, Cliff Shelf, S of Millard Ridge, E of Cedar Pass, elev. 800 m, on cottonwood bark, 17.viii.1991, *S. Will-Wolf 2643* (WIS), *S. Will-Wolf 2818* (WIS). **WYOMING.** CARBON CO.: ca. 16 mi S, 17 mi E of Saratoga, Medicine Bow National Forest: French Creek Campground, elev. 7700 ft, on rough bark of *P. tremuloides*, 19.ix.2010, *C.A. Morse 21610a & K. Logan* (KANU-383198, sub *Bacidia vermifera*). CONVERSE CO.: just E crossing of Cheyenne River on Rochelle Hills Rd, elev. 1500 m, on cottonwood bark, 5–8.vi.1975, *W.A. Weber s.n.* (COLO L-61718).

***Monoblastiopsis nigrocortina* R.C. Harris & C.A. Morse,** Opuscula Philolichenum 5: 93. 2008.
FIGURE 5.

COMMENTS. –For a description and illustrations of this species, see Harris and Morse (2008). Specimens distributed as *Lich. Exs. Magnicamporum 48* (*Morse 20913*) have slightly larger ascospores than reported by Harris and Morse (2008), (16.0)18.7–22.3–25.9(31.0) × (5.5)6.5–7.4–8.3(10.0) µm (n=52) (*vs.* (12)18.5–26 × (4.5)6.1(8) µm) and were ellipsoid to oblong, the longer spores frequently slightly curved. Ascomata were dispersed across the substrate or aggregated into groups of as many as 13 in small depressions in the sandstone. Ascus dimensions, which were not reported in Harris and Morse (2008), were (63)66–76–86(100) × (15.5)16–19–22(24) µm. Pycnidia were rather abundant; conidia were (2.5)3–3.5(4) × ca. 1 µm.

Harris and Morse (2008) reported *Monoblastiopsis nigrocortina* from concrete and calcareous rocks from the High Plains of eastern Colorado and western Kansas. Additional fieldwork and herbarium studies have turned up specimens from Arizona, Montana, Nebraska, South Dakota, and Wyoming. Specimens from Arizona, Montana, and South Dakota were from calcareous sandstones; and the specimen from Wyoming occurred on potassium feldspar-rich granite. Additional records from Colorado, reported here, were from both calcareous and non-calcareous sandstones.

A similar species, *Thrombium mongolicum* H. Magn., was reported new to North America by Anderson (1962). This publication was overlooked by Harris and Morse (2008), but based on material recently examined by CAM the specimens upon which the report was based are clearly referable to *Monoblastiopsis nigrocortina*. The authors have not examined the holotype of *T. mongolicum*, but, following Magnusson (1940), that species does not belong in *Thrombium*, a genus with non-periphysate ostioles and amyloid asci (Breuss 2002). Asian material referable to *T. mongolicum* is apparently still limited to the type collection, a group of some 12 ascomata (Magnusson 1940). Magnusson's description of *T. mongolicum* differs in minor ways from *M. nigrocortina*, in having an epilithic thallus, ± dispersed ascomata, asci 60–70 × 15–17 µm, and ascospores 16–20 × 6–7 µm. A name change in either taxon seems premature until material representing the range of morphological variation has been gathered for *T. mongolicum*, and perhaps until a revision of several other species referred to *Thrombium* (including *T. endolithicum* H. Magn. and *T. stereocarpum* J. Steiner) has been undertaken. Pending resolution of this issue, we recommend that *T. mongolicum* be removed from the North American list.

Specimens examined (for additional localities, see Harris & Morse 2008). — **U.S.A. ARIZONA.** MOHAVE CO.: Grand Canyon Parashant National Monument, elev. ca. 1500 m, sandstone bluff, 20.v.2003, *B.A. Iselin et al. BAI150* (ASU-56279, sub *Staurothele cf. verruculosa*). **COLORADO.** BACA CO.: ca 7 mi S, 11 mi W of jct of US hwys 287/385 & Baca Co Rd J in Campo, Comanche National Grassland: Holt Canyon: vicinity of Cave Spring, elev. 4250–4360 ft, on seepage track on E-facing cliff of Cretaceous Dakota Sandstone and Purgatoire Formation, 10.v.2010, *C.A. Morse 20695 et al.* (KANU-387112, KANU-387113). BACA or PROWERS CO.: ca 16 mi N, 4 mi E of Springfield, Two Buttes Reservoir State Wildlife Area, on N side of Two Buttes Reservoir, elev. 4250–4340 ft, on calcareous residuum, 26.ix.2010, *C.A. Morse 21765* (KANU-385393). BOULDER CO.: just W and NW of Boulder, elev. ca 5600 ft, sandstone outcrops, 9.ix.1961, *R.A. Anderson 1696* (COLO-160093); 1.5 mi N of Left Hand Canyon turnoff, 1.5 mi S of Red Hill, Morrison limestone, 13.x.1962, *R.A. Anderson 3746* (COLO-176511). EL PASO CO.: 8.5 mi S of Ellicott along Ellicott Hwy, TNC Bohart Ranch: W-central part of property, "Crows Roost" area along Black Squirrel Creek, elev. 5660–5740 ft, on eroded pale sandstone bluffs of Laramie Formation and Fox Hills Sandstone, 04.x.2007. *C.A. Morse 15895d & D. Ladd* (KANU-382351); 9.5 mi S, 1.5 mi W Yoder, Signal Rock area, elev. 5490–6000 ft, on small rocks in prairie, 05.x.2007, *C.A. Morse 15952f & D. Ladd* (KANU-382418). GARFIELD CO.: 9.8 mi W of Grand Valley [Parachute], juniper gully, 4.ix.1957, *S. Shushan S-11249* (COLO-126241). LARIMER CO.: Dakota Ridge, 4.5 mi SW of Ft Collins, just above Horsetooth Reservoir, elev. ca. 5450–5900 ft, sandstone and conglomerate outcrops of the Lytle Formation, 16.vii.1960, *R.A. Anderson 20266* (COLO-151029). LAS ANIMAS CO.: ca 17 mi S, 6 mi E of Timpas, Comanche National Grassland: Purgatoire Canyon: Bravo Canyon, elev. 4520–4640 ft, on red aeolian Triassic sandstone bedrock. 13.v.2010, *C.A. Morse 20913 et al.* (KANU-385398, KANU-385399, KANU-385400, KANU-385401, KANU-389892, and duplicates distributed as *Lich. Exs. Magnicamporum 43*). MOFFAT CO.: 1 mi N, 3 mi W of Sunbeam, BLM land: along N side of BLM rd 2122, just E of inters with CO Hwy 318, elev. 6180–6340 ft, Browns Park Formation sandstone outcrops, 13.vi.2009, *C.A. Morse 19133 & K. Logan* (KANU-382491). MONTROSE CO.: 7 mi W of Bedrock, Paradox Valley, elev. 6000 ft, Navajo sandstone ledge, 31.v.1960, *W.A. Weber et al. S-29976* (COLO-164752). OTERO CO.: ca 3.5 mi S, 14.5 mi E of Timpas, Comanche National Grassland: Vogel Canyon, just S of parking area, elev. 4350–4390 ft, on bedrock and boulders of non-calcareous sandstone of Lower Cretaceous Dakota Sandstone and Purgatoire Formation, 16.v.2011, *C.A. Morse 22379 et al.* (KANU-385394). YUMA CO.: 4 mi N, 8 mi W of Idalia, TNC Fox Ranch: area E of headquarters, elev. 3870–3930 ft, on Ogallala Formation outcrop, 07.x.2007, *C.A. Morse 15991b & D.*

Ladd (KANU-377725). **MONTANA.** MUSSELLSHELL CO.: ca 9.5 mi N, 2 mi W of Roundup on Hwy US 87, elev. 3800 ft, on Fort Union Formation sandstone outcrops, 21.v.2008, *C.A. Morse 16576 & D. Ladd* (KANU-380315). **NEBRASKA.** KIMBALL CO.: 0.5 mi S, 4.5 mi E of Bushnell, Oliver Reservoir State Recreational Area: E side below dam, elev. 4780–4810 ft, on Ogallala Formation cliff, 04.vii.2010, *C.A. Morse 21464* (KANU-387115). **SOUTH DAKOTA.** BENNETT CO.: 5 mi S, 7 mi E of Martin, LaCreek National Wildlife Refuge headquarters, elev. 925 ft, on concrete waterways, 18.vi.2007, *M.K. Advaita 6167-C* (KANU-379606). FALL RIVER CO.: Black Hills N of Edgemont, Fall River Formation, 23.vii.1953, *W.A. Weber 1953* (COLO L-77969); ca 8.1 mi S of Hot Springs, TNC Whitney Preserve guest house area, elev. 3200 ft, on sandstone boulder, 28.vi.2007, *M.K. Advaita 6252-B* (KANU-379632). **WYOMING.** ALBANY CO.: ca 6 mi S, 30 mi W of Glendo, Medicine Bow National Forest: Laramie Mountains: La Bonte Canyon: vicinity of Curtis Gulch Campground, elev. 6600–7000 ft, on granite boulder, 02–03.vii.2010, *C.A. Morse 21300c* (KANU-387114).

SPECIMEN LABEL DATA FOR FASCICLE 1 OF *LICHENES EXSICCATI MAGNICAMPORUM.*

1. *Fulgensia fulgens* (Sw.) Elenkin. USA, Wyoming, Platte Co: 1 mi W, 1 mi N of Guernsey. Guernsey State Park. 42°17.34′N, 104°46.63′W (determined by GPS; datum = WGS 84). Elevation ca 4400 ft. Moderate to steep slopes above Guernsey Reservoir on North Platte River; cottonwoods by lake, pine-juniper woodland on hills, sagebrush / yucca / cactus / mixed grasslands; sandy soil. On soil. Locally abundant / dominant. 14 June 2011. *M.K. Advaita 11899*.

2. *Psora decipiens* (Hedwig) Hoffm. USA, Wyoming, Platte Co: 1 mi W, 1 mi N of Guernsey. Guernsey State Park. 42°17.34′N, 104°46.63′W (determined by GPS; datum = WGS 84). Elevation ca 4400 ft. Moderate to steep slopes above Guernsey Reservoir on North Platte River; cottonwoods by lake, pine-juniper woodland on hills, sagebrush / yucca / cactus / mixed grasslands; sandy soil. On soil. Locally common. 14 June 2011. *M.K. Advaita 11902*.

3. *Trapeliopsis flexuosa* (Fr.) Coppins & P. James. USA, Nebraska, Thomas Co: ca 3.5 mi W of Halsey. Nebraska National Forest, Bessey Ranger District, on road to fire tower. 41°53.97′N, 100°19.62′W (determined by GPS; datum = WGS 84). Elevation ca 2800 ft. Moderately steep slopes of sand hills with planted forest of Ponderosa, jack, and Scotch pine plus cottonwood, green ash, hackberry, and thickets of chokecherry and American plum. On dry wood and pine cones on ground. Locally abundant. 15 May 2010. *M.K. Advaita 9674*.

4. *Opegrapha varia* Pers. [=*Alyxoria varia* (Pers.) Ertz & Tehler]. USA, Iowa, Taylor Co: 3 mi NE of Bedford. Lake of Three Fires State Park. 40°42.77′N 94°41.32′W (determined by GPS; datum = WGS 84). Elevation ca 353 m. Deciduous woodland (bur oak, honey locust, scattered black cherry) along lakeshore and gentle slopes above; mowed picnic and camping areas. On 2.5 ft dbh standing-dead oak. Locally abundant / dominant. 24 April 2009. *M.K. Advaita 6952*.

5. *Lecanora pallidochlorina* T.H. Nash *et al.* [cited in Opuscula Philolichenum 11: 60–63. 2012.]. USA, Oklahoma, Okmulgee Co: 0.5–0.75 mi N, 6 mi W of jct of US hwys 62 & 75 on S side of Okmulgee. Okmulgee State Park, on peninsula just N of Blackjack Area tent camping sites. T13N R12E section 07 E½ of NE¼. 35.61931°–35.62228°N, 96.06990°–96.06966°W (±18 ft; determined by GPS; datum = WGS 84). Elevation 700–745 ft. Dry-mesic to mesic cross timbers forest dominated by *Carya texana-Quercus marilandica-Q. stellata* association with low cliffs and boulders of sandstone on moderate S and W-facing slopes above Okmulgee Lake, and dominated by *Quercus stellata-Q. velutina* association with tall, shaded cliffs and large blocks of sandstone on N-facing slope above lake, with brushy understory dominated by *Amelanchier arborea*, *Juniperus virginiana*, and *Vaccinium arboreum*; and open, park-like areas around campsites and along road through peninsula. Soil rocky, sandy. Abundant on S-facing slope. TLC: usnic acid, zeorin, unknown. 06 Sept 2009. *C.A. Morse 20194 & K. Logan*.

6. *Candelariella subdeflexa* (Nyl.) Lettau. USA, Minnesota, Lac qui Parle Co: 3 mi S, 3 mi W of Odessa. Big Stone National Wildlife Refuge, central area. 45°14.98′N 96°37.25′W (determined by GPS; datum = WGS 84). Elevation ca 293 m. Extensive year-round and temporary wetlands, marshes, wet meadows, and tallgrass prairie along Minnesota River corridor; large granite outcrops / glades; wooded bottomlands of cottonwoods and willows; low relief. Numerous bull-dozed piles of recently clear-cut cottonwoods and Chinese elm in area of abandoned gravel pit. Sandy soil. On new stumps of 12-18 in diam Chinese elm, and felled cottonwood boles. Locally common. 30 July 2009. *M.K. Advaita 8396*.

7. *Caloplaca chrysophthalma* Degel. USA, Nebraska, Dixon Co: ca 2 mi N of Ponca to State Park, then 10 miles NNW on Highland Road. North Unit of Ponca State Park. 42°39.31′N 96°45.11′W (determined by GPS; datum = WGS 84). Elevation ca 345 m. Wooded Nebraska Loess Hills surrounding small flat valley of old farmstead with pasture, savanna of scattered mature bur oak, shelterbelts by farmhouse. On fallen 2.5 ft dbh bur oak. Locally common. 12 May 2009. *M.K. Advaita 7271*.

8. *Phaeophyscia nigricans* (Flörke) Moberg [mixed with *Phaeophyscia hirsuta* (Mereschk.) Essl.]. USA, Minnesota, Lac qui Parle Co: 1 mi S of Odessa. Big Stone National Wildlife Refuge, 1 mile S of headquarters. 45°15.23′N 96°20.37′W (determined by GPS; datum = WGS 84). Elevation ca 290 m. Extensive year-round and seasonal wetlands along Minnesota River bottomlands; large granite outcrops / glades; old shelterbelt including Chinese elm and green ash. On dead fallen aerial bole of hardwood. Locally abundant / dominant. 27 April 2009. *M.K. Advaita 7026*.

9. *Caloplaca microphyllina* (Tuck.) Hasse. USA, Nebraska, Cedar Co: ca 1 mi S of Yankton. Green Island Wildlife Management Area. 42°51.70′N, 97°24.26′W (determined by GPS; datum = WGS 84). Elevation ca 1200 ft. Backwaters and island of the Missouri River; sandy riparian ecosystem with green ash, juniper, black locust, scattered cottonwoods, shrubs, brome-grass. On 15 in diam round upright wooden pylons of old abandoned bridge. Locally abundant / dominant. 28 April 2010. *M.K. Advaita 9016*.

10. *Candelaria fibrosa* (Fr.) Müll. Arg. USA, Nebraska, Dixon Co: ca 2 mi N of Ponca. Ponca State Park. 42°36.36′N 96°43.29′W (determined by GPS; datum = WGS 84). Elevation ca 375 m. Deciduous forest (bur oak, green ash, cottonwood) on moderately steep slopes of the Nebraska Loess Hills, just above the south shore of the Missouri River. On 12 inch diam fallen cottonwood branch. Locally common. 11 May 2009. *M.K. Advaita 7224-A*.

11. *Physcia adscendens* (Fr.) H. Olivier. USA, Nebraska, Thomas Co: ca 2 mi W of Halsey. Nebraska National Forest, Bessey Ranger District, headquarters area. 41°54.09′N, 100°17.92′W (determined by GPS; datum = WGS 84). Elevation ca 2700 ft. Moderately steep slopes of sand hills with planted forest of Ponderosa, jack, and Scotch pine plus cottonwood, green ash, hackberry, and thickets of chokecherry and American plum. On roadside American plum. 15 May 2010. *M.K. Advaita 9658*.

12. *Physcia millegrana* Degel. USA, Iowa, Monona Co: ca 4 mi W, 2 mi N of Onawa. Lewis & Clark State Park. 42°02.80′N, 96°10.00′W (determined by GPS; datum = WGS 84). Elevation ca 1050 ft. Riparian woodland along an oxbow of the Missouri River, with cottonwoods, silver maple, willow, green ash, Chinese elm, juniper, and honey locust; sandy soil, minimal relief. Covers the bole of a 15 in dbh honey locust to 5 ft height. 22 April 2010. *M.K. Advaita 8889*.

13. *Lecidella euphorea* (Flörke) Hertel. USA, South Dakota, Day Co: ca. 6 mi N of Waubay. Waubay National Wildlife Refuge. 45°25.50′N, 97°19.59′W (determined by GPS). Elevation ca 1790 ft. Wooded island surrounded by prairie pothole lakes, a decade of rising water levels (up 15 ft) flooding shorelines and roads. Recent 100 mph wind caused many windfalls. On branches of fallen 10 in dbh green ash. Locally common. 27 August 2008. *M.K. Advaita 6835*.

14. *Graphis sophisticascens* Nyl. USA, Oklahoma, Okmulgee Co: 0.5 mi N, 5.5 mi W of jct of US hwys 62 & 75 on S side of Okmulgee. Just inside NE entrance to Okmulgee State Park, along S side of park rd just W jct with OK Hwy 56. T13N R12E section 08 NE¼ of SW¼. 35.61572°N, 96.06110°W (±18 ft; determined by GPS; datum = WGS 84). Elevation 640 ft. Disturbed riparian forest with *Betula nigra* and *Platanus occidentalis* along banks of Salt Creek. Abundant on bark of *Betula*. 06 Sept 2009. *C.A. Morse 20170 & K. Logan*.

15. *Teloschistes chrysophthalmus* (L.) Th. Fr. USA, Nebraska, Loup Co: ca 8 mi NW of Burwell. Calamus Reservoir State Recreation Area. 41°55.41′N, 99°18.86′W (determined by GPS; datum = WGS

84). Elevation ca 2175 ft. Sand hills; lakeside juniper, cottonwoods, pines, plum thickets; minimal relief. On American plum. Locally abundant. 4 May 2010. *M.K. Advaita 9265*.

16. ***Caloplaca flavorubescens*** **(Huds.) J.R. Laundon.** USA, Nebraska, Cherry Co: ca 4 mi E, 1 mi N of Valentine. Ft. Niobrara National Wildlife Refuge, Fort Falls Nature Trail. 42°54.04′N, 100°27.99′W (determined by GPS; datum = WGS 84). Elevation ca 2500 ft. Eastern deciduous and northern boreal forest (paper birch, basswood, aspen, ferns, club mosses) by Fort Falls on steep N-facing slope of Niobrara River valley. On fallen 8 inch diam hardwood by waterfall. 17 May 2010. *M.K. Advaita 9776*.

17. ***Physconia leucoleiptes*** **(Tuck.) Essl.** USA, Nebraska, Thurston Co: ca 9 mi SE of Homer. Thomas Ashford Boy Scout Ranch. 42°16.43′N, 96°22.79′W (determined by GPS; datum = WGS 84). Elevation ca 1120 ft. Moderately steep slopes of hills and bluff along the Missouri River, dense forest of bur oak, black walnut, hackberry, hickory, basswood, box elder; sandy soil. On bark of 20 inch diam fallen hardwood, at 10–20 ft height on bole. 21 April 2010. *M.K. Advaita 8824*.

18. ***Amandinea dakotensis*** **(H. Magn.) P. May & Sheard** [=*Buellia dakotensis* (H. Magn.) Bungartz]. USA, North Dakota, Ramsey Co: 10 mi W, 3.5 mi S of Devil's Lake. Graham Island State Park. 48°02.88′N 99°03.56′W (determined by GPS; datum = WGS 84). Elevation ca 441 m. Closed glacial drainage basin of lakes and marshes (water levels have risen 25 ft in past 10 years); mixed grass prairie; densely wooded parklands of bur oak, hackberry, green ash, American elm, and boxelder. On dead branches of American plum and chokecherry. Locally common. 11 June 2009. *M.K. Advaita 8019*.

19. ***Hyperphyscia syncolla*** **(Tuck. *ex* Nyl.) Kalb** [mixed with *Phaeophyscia ciliata* (Hoffm.) Moberg]. USA, South Dakota, Brookings Co: 1 mi N, 5 mi W of Bruce. Oakwood Lakes State Park, at N entrance sign. 44°27.31′N 96°58.05′W (determined by GPS; datum = WGS 84). Elevation ca 502 m. Pothole lakes, wetlands, mowed picnic and camping areas with scattered lakeside woods and shelterbelts (cottonwood, bur oak, green ash; pine in shelterbelts). On dead fallen shoots and boles of legume tree. Locally abundant / dominant. 1 June 2009. *M.K. Advaita 7712*.

20. ***Parmelia sulcata*** **Taylor.** USA, Montana, Dawson Co: 4.5 mi S, 1 mi E eastern jct of hwys US I-94 & Bus 94 (exit 215) in Glendive. Makoshika State Park: along main rd (Snyder Ave), just SW rd to Pine-on-Rocks Vista. T15N R56E section 18 E2/3 of S1/2 of NE1/4. Near 47.05623°N, 104.67264°W (determined by GPS; datum = WGS 84). Elevation 2480–2530 ft. Grazed, upland, sagebrush-grassland, primarily S-facing sandstone outcrops, and edge of mesic, open Ponderosa pine-juniper forest in steep-sided SE–NW-trending ravine in badlands formation. Soil rocky, sandy to silty. Abundant on wood of fallen logs and bark of *Pinus*. 27 May 2008. *C.A. Morse 17120*.

21. ***Flavopunctelia soredica*** **(Nyl.) Hale.** USA, Montana, Dawson Co: 4.5 mi S, 1 mi E eastern jct of hwys US I-94 & Bus 94 (exit 215) in Glendive. Makoshika State Park: along main rd (Snyder Ave), just SW rd to Pine-on-Rocks Vista. T15N R56E section 18 E2/3 of S1/2 of NE1/4. Near 47.05623°N, 104.67264°W (determined by GPS; datum = WGS 84). Elevation 2480–2530 ft. Grazed, upland, sagebrush-grassland, primarily S-facing sandstone outcrops, and edge of mesic, open Ponderosa pine-juniper forest in steep-sided SE–NW-trending ravine in badlands formation. Soil rocky, sandy to silty. Abundant on bark of *Juniperus* and *Pinus*, and on decorticated wood of stumps. 27 May 2008. *C.A. Morse 17106*.

22. ***Lecania constricta*** **W. A. Weber.** USA, South Dakota, Butte Co: 2 mi N, 7.5 mi E of jct of US hwys 85 & 212 in Belle Fourche. Belle Fourche Reservoir, W side: Rocky Point Recreation Area, around Group Camp B. T09N R03E section 25 NE¼ of SW¼. 44.71158°N, 103.70189°W (±14 ft; determined by GPS; datum = WGS 84). Elevation 2975 ft. Several large *Populus deltoides* growing in narrow, seasonally wet depression with *Alisma triviale*, *Eleocharis macrostachya* and *Amorpha fruticosa* adjacent to weedy lakeshore berm. Common to locally abundant on *Populus*. 12 July 2009. *C.A. Morse 19810*.

23. ***Arthonia caesia*** **(Flotow) Körber** [=*Chrysothrix caesia* (Flot.) Ertz & Tehler]. USA, Nebraska, Sherman Co: ca 1 mi S of Loup City. Gasteyer Nature Sanctuary. 41°15.87′N, 98°58.59′W (determined by GPS; datum = WGS 84). Elevation ca 2070 ft. Riparian woodland along Middle Loup River; flat terrain, sandy soil. On American plum. Locally abundant. 9 May 2010. *M.K. Advaita 9491*.

24. ***Xanthomendoza hasseana*** **(Räsänen) Søchting et al.** [mixed with *Xanthomendoza* ***fallax*** (Arnold) Søchting et al.]. USA, Nebraska, Cherry Co: ca 3 mi E, 1 mi N of Valentine. Ft. Niobrara National Wildlife Refuge. 42°53.95′N, 100°28.81′W (determined by GPS; datum = WGS 84). Elevation ca 2580 ft. Riparian sand hills community along the Niobrara River; green ash, box elder, and Chinese elm on a steep N-facing slope. On dead branches and twigs of American plum and Chinese elm. Locally abundant. 18 May 2010. *M.K. Advaita 9826*.

25. ***Caloplaca pyracea*** **(Ach.) Th. Fr.** USA, Nebraska, Cherry Co: ca 3 mi E, 1 mi N of Valentine. Ft. Niobrara National Wildlife Refuge, roadside 100 yd past Niobrara River Bridge. 42°53.95′N, 100°28.81′W (determined by GPS; datum = WGS 84). Elevation ca 2580 ft. Riparian sand hills community along the Niobrara River; green ash, box elder, and Chinese elm on a steep N-facing slope. On dead branches of Chinese elm. Locally abundant. 17 May 2010. *M.K. Advaita 9755*.

26. ***Cladonia rei*** **Schaerer.** USA, Nebraska, Sherman Co: ca 1 mi E of Loup City. Roadside on 790th Road. 41°16.77′N, 98°56.61′W (determined by GPS; datum = WGS 84). Elevation ca 2100 ft. Rolling hills of the Central Loess Plains, primarily rangeland and cropland. On soil of near-vertical N-facing road-cut. Locally abundant. TLC: homosekikaic acid. 10 May 2010. *M.K. Advaita 9508*.

27. ***Caloplaca ulcerosa*** **Coppins & P. James.** USA, Minnesota, Lac qui Parle Co: 3 mi S, 3 mi W of Odessa. Big Stone National Wildlife Refuge, central area. 45°14.98′N 96°37.25′W (determined by GPS; datum = WGS 84). Elevation ca 293 m. Extensive year-round and temporary wetlands, marshes, wet meadows, and tallgrass prairie along Minnesota River corridor; large granite outcrops / glades; wooded bottomlands of cottonwoods and willows; low relief. Numerous bull-dozed piles of recently clear-cut cottonwoods and Chinese elm in area of abandoned gravel pit. Sandy soil. On new stumps of 12–18 inch diam Chinese elm. Locally common. 30 July 2009. *M.K. Advaita 8397*.

28. ***Caloplaca ulcerosa*** **Coppins & P. James.** USA, Nebraska, Wheeler Co: ca 9 mi S, ½ mi E of Bartlett. Pibel Lake State Recreation Area. 41°45.44′N, 98°31.99′W (determined by GPS; datum = WGS 84). Elevation ca 2165 ft. Lakeside mowed picnic and camping areas; planted trees (silver maple, cottonwood, box elder, bur oak, honey locust, elm, hackberry; sandhills with adjacent agricultural land, minimal relief. On bole of 2 ft dbh fallen Chinese elm. Locally abundant. 2 May 2010. *M.K. Advaita 9169*.

29. ***Rinodina pyrina*** **(Ach.) Arnold** [duplicate determined by John Sheard]. USA, South Dakota, Fall River Co: 2.5 mi N, 13.5 mi E of Edgemont. TNC Whitney Preserve at Cascade Creek: just SE of guest house along Payne Canyon. T08S R05E section 19 NE¼ of SE¼. 43.33826°N, 103.56249°W (±21 ft; determined by GPS; datum = WGS 84). Elevation 3400 ft. Weedy, highly degraded cattle pasture along gentle, NW–SE-trending ravine. Scattered *Artemisia* and *Prunus* colonies. Abundant on dead *Prunus* stems. 09 July 2009. *C.A. Morse 19507*.

30. ***Acarospora stapfiana*** **(Müll. Arg.) Hue.** USA, South Dakota, Pennington Co: 5.5 mi S, 0.75 mi E of Quinn. Buffalo Gap National Grassland: just W of Bullhead Dam: 1 mi S from Interstate 90 exit 121 on Big Foote Rd, then 3.0 roadmi N & W on two-track to site. T01S R17E sect 32 center S¼ & T02S R17E sect 05 center N¼. Near 43.90626°N, 102.10963°W (±11 ft; determined by GPS; datum = WGS 84). Elevation 2620–2660 ft. Weedy, grazed, mixed-grass prairie on gently rolling terrain on primarily S-facing slopes above Whitewater Creek, with low, rocky, largely barren, ± conical hills and shallow, seasonally wet depressions. Abundant platy limestone residuum of Chadron Formation on hilltops; scattered non-calcareous boulders on lower slopes. Soil silty. Abundant on limestone. Associated with *Caloplaca trachyphylla* [19873]. 13 July 2009. *C.A. Morse 19858*.

31. ***Cyphelium notarisii*** **(Tul.) Blomb. & Forss.** USA, Colorado, Yuma Co: 3.75 mi N, 8.75 mi W of Idalia. TNC Fox Ranch: area just E of headquarters. T03S R45W section 31 NW¼ of NW¼. 39.7566°N, 102.4610°W (determined by GPS; datum = WGS 84). Elevation 3895 ft. Discarded lumber pile in farm yard. Abundant on old fence posts. 08 October 2007. *C.A. Morse 16063 & D. Ladd.*

32. ***Xanthoparmelia chlorochroa* (Tuck.) Hale.** USA, Colorado, El Paso Co: 1.5 mi S, 2.5 mi W Ramah. Ramah Reservoir State Wildlife Area: W and N side. T11S R61W section 10 S½ of SW¼ & section 15 N½ of NW¼. 39.0957°–39.1024°N, 104.2189–104.2106°W (determined by GPS; datum = WGS 84). Elevation 6180–6240 ft. *Salix amygdaloides-Populus deltoides* woodland along Big Sandy Creek and disturbed, S-facing slope with shortgrass prairie vegetation, and scattered granitic boulders of unknown provenance on upper slope. Soil silty. Locally abundant in barren areas of prairie. TLC: usnic acid, salazinic acid, consalazinic acid. 04 October 2007. *C.A. Morse 15816.*

33. ***Arthrosporum populorum* A. Massal.** USA, Kansas, Cheyenne Co: ca 2 mi S, 4 mi W St. Francis. St. Francis Wildlife Area: along E side of Rd 10, 1.1 mi S jct with KS Hwy 36. T04S R41W Section 01 NW¼ of NW¼. 39.73872°–39.74111°N, 101.87703°–101.88109°W (±36 ft; determined by GPS; datum = WGS 84). Elevation 3350–3380 ft. Degraded, weedy *Populus-Salix* woodland along N side of South Fork Republican River, with scattered *Acer negundo*, *Elaeagnus*, *Juniperus*, and *Tamarix*. Common on bark of dead twigs of *Salix*. 29 October 2008. *C.A. Morse 18077.*

34. ***Candelariella antennaria* Räsänen.** USA, Colorado, Yuma Co: 4 mi N, 7 mi W of Idalia. TNC Fox Ranch: area E of headquarters. T03S R45W sect 28 SW¼ of SW¼, sect 32 E¼ of NE¼ & sect 33 W½ of NW¼. 39.7543°–39.7595°N, 102.4258°–102.4223°W (determined by GPS; datum = WGS 84). Elevation 3840–3900 ft. Grazed, open *Populus deltoides* (*-Salix amygdaloides*) floodplain forest along Arikaree River and low Ogallala Formation bluffs and grazed sandsage prairie on S-facing slope above river. Soil sandy. Common to locally abundant on bark of *Populus* and *Salix*. 08 October 2007. *C.A. Morse 16080 & D. Ladd.*

35. ***Caloplaca lignicola* Wetmore** [duplicate of paratype: The Bryologist 112: 379–386. 2009.]. USA, Minnesota, Clay Co: ca 3 mi E & 2 mi S of Glyndon. The Nature Conservancy's Bluestem Prairie Preserve. 46°50.78′N 96°28.61′W (determined by GPS). Elevation ca 925 ft. Flat open tallgrass prairie; few scattered glacial erratics and rock piles; occasional old homestead with shelterbelts. On wooden shingles of old fallen-down shack, roof now at ground level. Locally frequent. 9 May 2008. *M.K. Advaita 6629.*

36. ***Hyperphyscia confusa* Essl., C.A. Morse & S. Leavitt [ISOTYPE**: The Bryologist 115: 31–32. 2012; determined by Theodore L. Esslinger]. USA, Nebraska, Holt Co: 1.5 mi S, 1 mi E of O'Neill. Private land near Dry Creek State Wildlife Management Area. 42°26.03′N 98°37.03′W (determined by GPS; datum = WGS 84). Elevation ca 598 m. Riparian woods of cottonwood, eastern red cedar, American elm, Chinese elm, silver maple; very sandy soil. On 5.5 ft dbh silver maple. Locally abundant / dominant. 17 May 2009. *M.K. Advaita 7447.*

37. ***Flavopunctelia soredica* (Nyl.) Hale.** USA, Nebraska, Blaine Co: ca 8 mi S of Halsey. Nebraska National Forest, Bessey Ranger District, Whitetail Campground. 41°47.86′N, 100°15.75′W (determined by GPS; datum = WGS 84). Elevation ca 2690 ft. Riparian woodland along the Middle Loup River (predominantly green ash and juniper with some hackberry plus planted forest of Ponderosa, jack, and Scotch pine; plum and chokecherry thickets), sand hills with moderately steep slopes. On bark of piled-up dead American plum and chokecherry. Locally common. 14 May 2010. *M.K. Advaita 9629.*

38. ***Physcia adscendens* (Fr.) H. Olivier.** USA, North Dakota, Bottineau Co: 10 mi N, 4 mi E of Bottineau. Lake Metigoshe State Park, below park manager's house. 48°59.08′N 100°19.82′W (determined by GPS; datum = WGS 84). Elevation ca 670 m. Turtle Mountains with glacial lakes and ponds, wetlands, streams, open meadows; surrounding moderately steep slopes with upland forests of bur oak, quaking aspen, paper birch, chokecherry, and thickets of beaked hazel. Partly-shaded rubbish piles just within aspen forest at edge of large open meadow. On old picnic tables discarded in aspen grove. Locally abundant / dominant. 12 June 2009. *M.K. Advaita 8094.*

39. ***Caloplaca ulmorum* (Fink) Fink.** USA, Nebraska, Blaine Co: ca 8 mi S of Halsey. Nebraska National Forest, Bessey Ranger District, Whitetail Campground. 41°47.86′N, 100°15.75′W (determined by GPS; datum = WGS 84). Elevation ca 2690 ft. Riparian woodland along the Middle Loup River (predominantly green ash and juniper with some hackberry plus planted forest of Ponderosa, jack, and Scotch pine; plum and chokecherry thickets), sand hills with moderately steep slopes. On green ash. Locally abundant. 14 May 2010. *M.K. Advaita 9594.*

40. ***Rhizocarpon disporum*** **(Naeg.** ***ex*** **Hepp) Müll. Arg.** USA, Colorado, Otero Co: ca 3.5 mi S and 14.5 mi E of Timpas. Comanche National Grassland, in Vogel Canyon. T26S R55W sec 19. 37.768°N, 103.513°W. Elevation ca 4370 ft. Extensive canyon system in Cretaceous Dakota Sandstone: sandy soil with grazed shortgrass prairie uplands and *Juniperus monosperma* woodlands on slopes; small, spring-fed pools along canyon bottom, with *Populus deltoides* and *Celtis reticulata.* On massive slab just below upper bluff face of north-facing canyon wall. 16 May 2011. *D. Ladd 32024 with C. Morse & S. Olson.*

41. ***Xanthomendoza hasseana*** **(Räsänen) Søchting** ***et al.*** USA, North Dakota, Grand Forks Co: 1.5 mi N of Arvilla. Turtle River State Park, old farmstead NE corner of park along Turtle River. 47°56.65′N 97°28.99′W (determined by GPS; datum = WGS 84). Elevation ca 290 m. Heavily wooded river valley along the Turtle River and tributaries; forest of bur oak, green ash, cottonwood, and aspen; occasional glacial erratics; low hills with moderate slopes; tallgrass prairie, single wetland, oak savanna. On fallen green ash and dead branches of hawthorn. Locally abundant / dominant. 6 June 2009. *M.K. Advaita 7878.*

42. ***Parmotrema reticulatum*** **(Taylor) M. Choisy.** USA, Oklahoma, Wagoner Co: 2 mi S of Leonard. Bixhoma Lake. 35°53.61′N, 95°47.71′W (determined by GPS; datum = WGS 84). Elevation ca 610 ft. Scrub oak forest (post oak / blackjack oak) on steep slopes above manmade lake; sandstone outcrops and boulders, sandy soil. On fresh-fallen 10 in diam post oak branch, from 15 ft height on bole. Locally abundant /dominant. 17 April 2011. *M.K. Advaita 10743.*

43. ***Monoblastiopsis nigrocortina*** **R.C. Harris & C.A. Morse.** USA, Colorado, Las Animas Co: ca 17 mi S, 6 mi E of Timpas. (Timpas in Otero Co.) Comanche National Grassland: Purgatoire Canyon: Bravo Canyon. T28S R56W section 34 E½ of NE¼ & section 35 W½ of NW¼. 37.56727°–37.57228°N, 103.66512°–103.66129°W (±13–20 ft; determined by GPS; datum = WGS 84). Elevation 4520–4640 ft. Gentle to moderate slopes of canyon, with S-facing outcrops of buff-colored oolitic limestone and red sandstone of Lower Jurassic Morrison Formation and extensive, N and NE-facing expanses of red aeolian sandstone bedrock of an unnamed formation of Triassic age (previously considered to be Entrada Sandstone). Vegetation comprising a transition from shortgrass prairie on level uplands to *Juniperus monosperma* woodland on slopes and over bedrock, with mixed-grass prairie vegetation towards bottom of ravine, where *Bouteloua curtipendula*, *Hesperostipa neomexicana*, and *Schizachyrium scoparium* become common. Significant shrubby component including *Artemisia bigelovii*, *Atriplex canescens*, *Cercocarpus montanus*, *Cylindropuntia imbricata*, *Ericameria nauseosa*, *Rhus pilosissima*, and *Yucca glauca.* Soil rocky. Abundant on sandstone bedrock. 13 May 2010. *C.A. Morse 20913 with D. Ladd & S. Olson.*

44. ***Bacidia bagliettoana*** **(A. Massal. & De Not.) Jatta.** USA, Nebraska, Sherman Co: ca 1 mi E of Loup City. Roadside on 790th Road. 41°16.77′N, 98°56.61′W (determined by GPS; datum = WGS 84). Elevation ca 2100 ft. Rolling hills of the Central Loess Plains, primarily rangeland and cropland. On soil of near-vertical N-facing road-cut. Locally abundant. 10 May 2010. *M.K. Advaita 9510.*

45. ***Cladonia rei*** **Schaerer.** USA, Nebraska, Valley Co: ca 5 mi S of North Loup. Roadside. 41°24.96′N, 98°46.57′W (determined by GPS; datum = WGS 84). Elevation ca 1960 ft. Agricultural land (row crops and pasture); gently rolling loess hills. On soil of near-vertical N-facing road-cut. Locally abundant. TLC: homosekikaic acid. 6 May 2010. *M.K. Advaita 9358.*

46. ***Diploschistes muscorum*** **(Scop.) R. Sant.** USA, Nebraska, Blaine Co: ca 1 mi W of Brewster. Road-cut on Highway 92. 41°50.03′N, 100°05.34′W (determined by GPS; datum = WGS 84). Elevation ca 2495 ft. Moderate slopes of sand hills; rangeland and cropland. Locally abundant. On soil of steep N-facing road-cut. 16 May 2010. *M.K. Advaita 9684.*

47. ***Arthrosporum populorum*** **A. Massal.** USA, South Dakota, Hand Co: 6 mi N, 7 mi W of Miller. Lake Louise State Recreation Area. 44°38.38′N, 98°08.34′W (determined by GPS; datum = WGS 84). Elevation ca 1570 ft. Mowed picnic & camping areas, planted trees (elm, green ash, hackberry, pine, juniper, cottonwood, willow); surrounding cropland and rangeland, minimal relief. On dead pine branches and twigs. 3 June 2010. *M.K. Advaita 9939*.

48. ***Fellhanera crucitignorum*** **C.A. Morse & Ladd** [**ISOTYPE**: The Lichenologist 45: 341–342. 2013.]. USA, Kansas, Woodson Co: 6 mi E of Toronto. Woodson Co State Fishing Lake & Wildlife Area on SE side. T26S R14E Section 11 SE¼ of SE¼. 37.79396°–37.79463°N, 95.83590°–95.83416°W (±13–18 ft; determined by GPS; datum = WGS84). Elevation 1020–1050 ft. Upland Cross Timbers (*Quercus marilandica–Quercus stellata–Quercus velutina*) forest with open to brushy understory dominated by *Quercus* saplings, *Rhus copallina,* and *Rubus* spp., with frequent outcrops and boulders of non-calcareous sandstone of Upper Pennsylvanian Stranger Formation, on gentle, primarily W-facing slopes and along intermittent streams above lake. Site evidently partially burned in recent years. Soil sandy. Common to locally abundant on outcrops and small rocks, and overgrowing bryophytes; occasionally on stabilized soil. 18 Mar 2012. *C.A. Morse 23306 & K.J. Morse*.

49. ***Phaeophyscia hirsuta*** **(Mereschk.) Essl.** USA, Nebraska, Cedar Co: ca 1 mi S of Yankton. Green Island Wildlife Management Area. 42°51.70′N, 97°24.26′W (determined by GPS; datum = WGS 84). Elevation ca 1200 ft. Backwaters and island of the Missouri River; sandy riparian ecosystem with green ash, juniper, black locust, scattered cottonwoods, shrubs, brome-grass. On 15 inch diam fallen wooden pylon of old abandoned bridge. Locally abundant. 28 April 2010. *M.K. Advaita 9018*.

50. ***Strangospora microhaema*** **(Norman) R. Anderson.** USA, South Dakota, Codington Co: ca 3 mi S, 3 mi W of Watertown. Pelican Lake State Recreation Area. 44°51.33′N, 97°11.79′W (determined by GPS; datum = WGS84). Elevation ca 430 m. South shore of lake, mowed campgrounds with scattered trees and shelterbelts, plum thickets, some lakeside cottonwoods; minimal relief. On fallen 2 ft dbh cottonwood at shoreline, at 10 to 20 ft height on bole. Locally common. 30 March 2010. *M.K. Advaita 8534*.

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Miscellaneous reports of lichenicolous fungi from Argentina including the new species *Didymellopsis nephromatis*

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ABSTRACT. – Two lichenicolous fungi are newly reported from Argentina: *Myxophora leptogiophila* (on *Leptogium* sp.) and *Nectriopsis lecanodes* (on *Peltigera* sp.). *Didymellopsis nephromatis*, found growing on *Nephroma cellulosum*, is described as new to science. A list of 60 lichenicolous fungi formerly known from the country is provided.

KEYWORDS. – lichen parasites, cyanolichens, South America.

INTRODUCTION

To date 60 species of lichenicolous fungi have been reported from Argentina (see the appendix herein), which is many fewer than the number of species known from neighboring Chile (Etayo & Sancho 2008). To promote studies of this insufficiently known group of fungi we summarize here their former records in Argentina and present new data obtained from the revision of a small collection of cyanolichens made by the third author in *Nothofagus* forests in Río Negro Province of Argentina, which revealed one undescribed and six noteworthy species documented in further detail below.

MATERIALS AND METHODS

Material was examined with Zeiss microscopes Stemi 2000−CS and Axio Imager A1 equipped with Nomarski differential interference contrast optics in water, 10% KOH (K) or Lugol's iodine, directly (I) or after a KOH pre-treatment (K/I). The length, breadth, and length/breadth ratio (l/b) of the asci and ascospores are given as: (min−){X −SD}−{X +SD}(−max), where min and max are the extreme values, X the arithmetic mean, and SD the corresponding standard deviation. The examined specimens are housed in LE and UPS.

THE SPECIES

***Abrothallus secedens* Wedin & R. Sant.**

NOTE. – This species is known from scattered finds in Argentina, Chile, Colombia, the U.S.A. and Kenya (Etayo 2002, Etayo & Sancho 2008, Spribille et al. 2010, Wedin 1994).

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Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, *Nothofagus dombeyi* forest, 41°04′S, 71°33′W, elev. approx. 800 m, on epiphytic *Pseudocyphellaria* sp. (upper lobe sides, associated with bleached areas) growing on *N. dombeyi*, 18.x.2009, *K. Fedrowitz AR-1810413* (LE 261156, UPS).

***Corticifraga* cf. *fuckelii* (Rehm) D. Hawksw. & R. Sant.**

NOTE. – The ascospores in the specimen cited here are somewhat wider than reported for the species by Hawksworth & Santesson (1990), viz. (13.0–)14.1–17.9(–20.6) × (5.3–)6.1–7.5(–8.1) µm, l/b = (1.9–)2.2–2.6(–2.7) (n = 21, in water) vs. (12–)13–17(–19) × (4–)4.5–6 µm.

Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, path to mountain hut Refugio Frey, burned forest with *Nothofagus* and bamboo, 41°12′34.596″S, 71°26′54.599″W, 1166 m, on *Peltigera* sp. (upper lobe sides, pathogenicity not seen) growing on rock/soil, 16.x.2009, *K. Fedrowitz AR-1610323* (LE 261186, UPS).

***Didymellopsis nephromatis* Zhurb. & Etayo sp. nov.**

MYCOBANK #MB 812233.

FIGURES 1 AND 2.

DIAGNOSIS. – Differs from *Didymellopsis collematum* in its longer ascospores, (22.8–)25.4–30.0(–33.5) × (5.8–)7.2–9.2(–10.5) µm vs. 20–26 × 5–10 µm long, production of dark brown zoned patches on the host thallus, distinct pathogenicity and host selection.

TYPE: **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, road towards Mount Tronador (Nahuel Huapi National Park), *Nothofagus* forest, 41°S, 71°W, on *Nephroma cellulosum* (upper lobe surface) growing on tree branch, 21.x.2009, *K. Fedrowitz AR-2110111a* (LE 261343!, holotype).

DESCRIPTION. – *Infection* produces dark brown circular patches on the host lobes up to at least 2 mm in diameter composed of dark brown tissue ca. 100 µm thick. *Ascomata* perithecioid, aggregated, centered on the patches, black, at first immersed then erumpent, subglobose to pyriform, 150–250(–400) µm diam., dispersed to concentric, merged above with the dark host tissue. *Ascoma wall* not layered, dark brown, with pigmentation that appears rather evenly amorphous and is probably associated with the hyphal walls, K+ olive brown, ca. 30–60 µm thick, composed of ca. 5 layers of angular rounded to tangentially flattened cells. *Hamathecium* of well developed, persistent, hyaline, long, branched and occasionally anastomosing, septate, apically not swollen interascal filaments, 1.5–3(–4) µm thick and hyaline, branched, septate, apically somewhat swollen, short filaments, 3–5.5 µm thick, radially growing in the upper part of the ascomata near the ostiolar region. *Asci* fissitunicate, subcylindrical to slightly wider in the central part, with long foot, sometimes with a small ocular chamber ca. 2 × 1.5 µm, (90–)100–110(–130) × (12–)14–18 µm (n = 19, in water or K/I), 4–6(–8)-spored, I and K/I– except plasma staining orange. *Ascospores* diagonally uni- to biseriately arranged in the asci, hyaline, narrowly obovate (with wider upper cell) to narrowly ellipsoid, sometimes with rather acute ends, smooth-walled, without halo, 1-septate, sometimes the upper cell up to 1.5 times longer than the lower one, often somewhat constricted at the septa, (20.0–)24.9–30.1(–33.5) × (5.8–)7.2–9.2(–10.5) µm, l/b = (2.2–)3.0–3.8(–4.6) (n = 130, in water or K/I), with 1–2 large guttules in each cell.

ECOLOGY AND DISTRIBUTION. – *Didymellopsis nephromatis* is only known from the type locality in *Nothofagus* forest where it was found growing on *Nephroma cellulosum*. The fungus is clearly pathogenic, as the infected host tissues evidently die. *Nothofagus* forests are the climax forest community in southern South America supporting rich lichen diversity.

DISCUSSION. – The new species seems to match the genera *Didymellopsis* (Sacc.) Clem. & Shear and *Zwackhiomyces* Grube & Hafellner (diagnostic characters of both genera are presented in Table 1). Its ascomatal wall pigmentation type, hyaline, non-ornamented ascospores and cyanobacterial host lichen fit better the concept of *Didymellopsis*. However, the pyriform ascomata, which match those found in *Zwackhiomyces*, have not been previously observed in *Didymellopsis*. Within *Didymellopsis*, *D. nephromatis* is most similar to *D. collematum* (J. Steiner) Grube & Hafellner, which has shorter ascospores, measuring 20–26 × 5–10 µm (Grube & Hafellner 1990), and is known from Eurasia where it grows on *Collema* species.

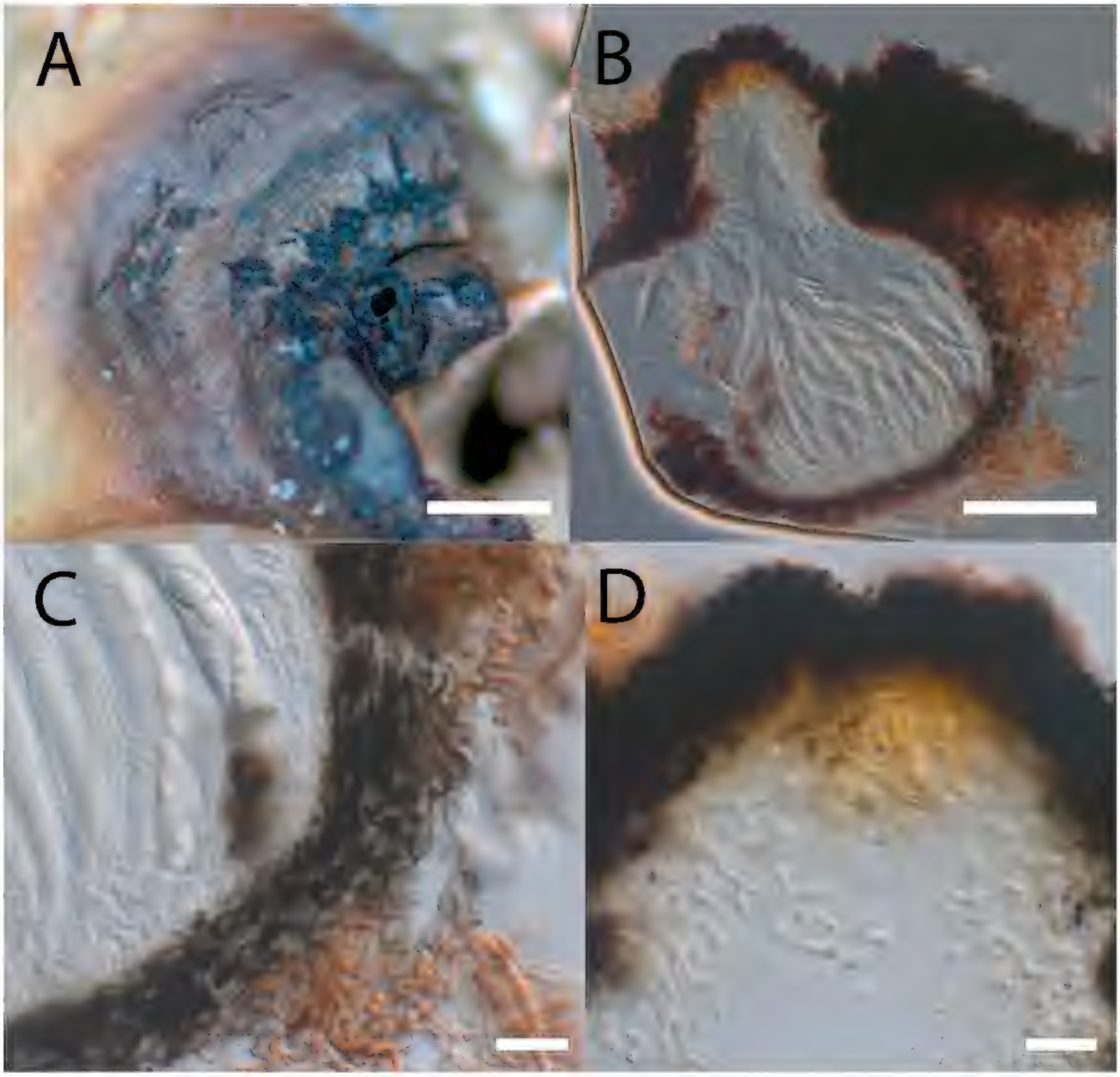

Figure 1. *Didymellopsis nephromatis* (holotype). A, infection habitus of *Nephroma cellulosum* lobe. B, ascomata section in water. C, ascoma wall section in K. D, filaments near the ostiolar region in K. Scale bars: A = 0.5 mm; B = 100 µm; C, D = 20 µm.

The new species can be easily recognized in the field by its concentrically zoned brown infection patches around the ascomata, a feature otherwise unknown in both *Didymellopsis* and *Zwackhiomyces*. The patches are reminiscent of the Neotropical lichenicolous fungus *Chloroepilichen rolfii* Etayo, which also grows on macrolichens of the order Peltigerales (species of *Yoshimuriella*; Etayo 2010). However, the ascomata of *C. rolfii* are apothecia and the zonation is typically green.

Endococcus pseudocyphellariae **Etayo**

Notes. – The ascospores in the specimens cited below are (9.3–)11.6–14.6(–16.4) × (3.5–)4.3–5.3(–5.9) µm, l/b = (2.1–)2.4–3.0(–3.6) (n = 91, in water or I), which differs slightly from the former reports, viz. (1.5–)13–15(–16) × 4–5 µm (Etayo & Sancho 2008) or (8.5–)10–12.5(–15) × (3–)3.5–4(–5) µm, l/b = (2.1–)2.5–3.5(–4.9) (Zhurbenko & Tugi 2013). Formerly known from Chile (many records) and from single finds in Russia (Khabarovsk Territory) and Argentina (El Turbio) (Etayo & Sancho 2008, Zhurbenko & Tugi 2013).

	Didymellopsis (previously known species)	*Zwackhiomyces*	*Didymellopsis nephromatis*
ascomata shape	never pyriform	globose to pyriform	subglobose to pyriform
ascomatal wall pigmentation	evenly amorphous, associated with the hyphal walls	cloudy granulate, associated with the interhyphal spaces	appearing rather evenly amorphous, probably associated with the hyphal walls
ascospore pigmentation and ornamentation	hyaline, non-ornamented	hyaline or occasionally brown, often distinctly ornamented	hyaline, non-ornamented
photobiont of the host lichens	cyanobacteria (including the type species of the genus), occasionally green algae	green algae, occasionally cyanobacteria	cyanobacteria

Table 1. Main distinguishing characteristics of *Didymellopsis* and *Zwackhiomyces* compiled from Calatayud et al. (2007), Grube & Hafellner (1990), Lawrey & Diederich (2015) and J. Hafellner (pers. comm.), contrasted with the characteristics of the new taxon.

Specimens examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, *Nothofagus dombeyi* forest, 41°2′44.988″S, 71°33′16.307″W, elev. 1020 m, on epiphytic *Pseudocyphellaria* sp. (upper lobe surface) growing on *Nothofagus*, 19.x.2009, *K. Fedrowitz AR-1910412* (LE 261303); San Carlos de Bariloche, road towards Mount Tronador, *Nothofagus* forest, 41°S, 71°W, on epiphytic *Nephroma* sp. (upper lobe surface) growing on tree branch, 21.x.2009, *K. Fedrowitz AR-2110111b* (LE 261453).

Hemigrapha asteriscus **(Müll. Arg.) D. Hawksw.**

NOTE. – This is a rarely reported species in Argentina (Diederich & Wedin 2000).

Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, Puerto Blest, *Nothofagus* forest, 41°2′S, 71°48′W, elev. approx. 800 m, on epiphytic *Peltigera* sp. (upper sides of lobes), 3.xi.2009, *K. Fedrowitz AR-0311911* (LE 261056, UPS).

Myxophora leptogiophila **(G. Winter) Nik. Hoffm. & Hafellner**

NOTE. – Formerly known in South America only from Chile (Tierra del Fuego region), this species is here reported new to Argentina (Etayo & Sancho 2008).

Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, Mount Tronador, *Nothofagus* forest, 41°S, 71°W, on epiphytic *Leptogium* sp. (thallus), 21.x.2009, *K. Fedrowitz AR-2110111* (LE 261283).

Nectriopsis lecanodes **(Ces.) Diederich & Schroers**

NOTE. – The species is common and widespread in the Northern Hemisphere, but was so far known in South America only from a single find in Peru (Etayo 2010). This is the first report forom Argentina.

Specimen examined. – **ARGENTINA. Río Negro PROV.:** San Carlos de Bariloche, path to mountain hut Refugio Frey, burned forest, 41°12′34.02″S, 71°26′44.016″W, elev. 1167 m, on *Peltigera* sp. (decaying basal lobe portions) on rock/soil, 16.x.2009, *K. Fedrowitz AR-1610231* (UPS).

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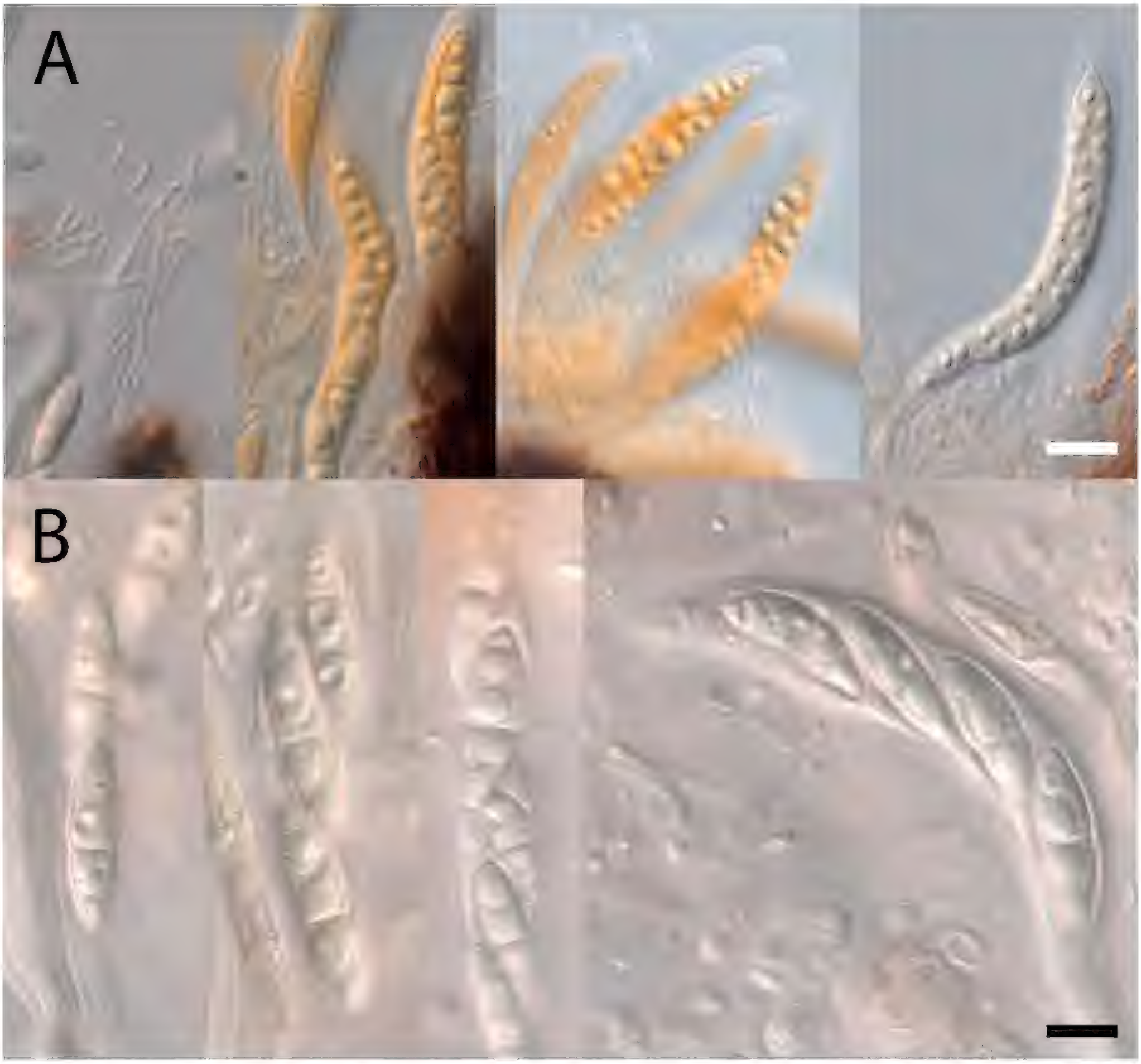

Figure 2. *Didymellopsis nephromatis* (holotype). A, interascal filaments and asci in K/I. B, ascospores in water. Scale bars: A = 20 µm; B = 10 µm.

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APPENDIX: LICHENICOLOUS FUNGI FORMERLY RECORDED FROM ARGENTINA

Abrothallus granulatae Wedin (syn. *Vouauxiomyces granulatae* Wedin) – References: Suija et al. 2015, Wedin 1994

Abrothallus secedens Wedin & R. Sant. – References: Suija et al. 2015, Wedin 1994

Abrothallus parmeliarum (Sommerf.) Arnold – Reference: Bernasconi et al. 2002. As the fungus was collected on a species of *Menegazzia* it likely does not belong to that species and perhaps refers to *A. stroblii* Hafellner, a species growing on that host.

Amandinea deminuta Hafellner (syn. *Buellia uruguayensis* Etayo & Osorio) – References: Etayo & Osorio 2004, Hafellner 2004a. The two names were created in the same year for the same fungus growing on the same host.

Arthonia badia Wedin & Hafellner (syn. *Subhysteropycnis maculiformans* Wedin & Hafellner) – Reference: Wedin & Hafellner 1998

Arthonia cinnabarinula Müll. Arg. (syn. *Helicobolomyces lichenicola* Matzer) – Reference: Lücking et al. 2003.

Arthonia coriifoliae Wedin & Hafellner – Reference: Wedin & Hafellner 1998

Arthonia epiphyscia Nyl. – Reference: Santesson 1960

Arthonia flavicantis Wedin & Hafellner – References: Santesson 2001, Wedin & Hafellner 1998

Arthonia microsticta Vain. – Reference: Lücking et al. 2003

Arthonia muscigena Th. Fr. (syn. *A. minuta* Wedin & Hafellner) – Reference: Wedin & Hafellner 1998

Arthonia peltigerina (Almqu.) Oliv. – Reference: Etayo & Sancho 2008

Arthonia santessoniana Wedin & Hafellner – Reference: Wedin & Hafellner 1998

'Arthonia' semi-immersa Wedin & Hafellner – Reference: Wedin & Hafellner 1998

Arthonia subaggregata Wedin & Hafellner – Reference: Wedin & Hafellner 1998

Arthonia sytnikii S.Y. Kondr. – Reference: Kondratyuk 1996

Biatoropsis usnearum Räsänen – Reference: Diederich & Christiansen 1994

Chaenothecopsis arthoniae Tibell – Reference: Tibell 1998

Chaenothecopsis australis Tibell – Reference: Tibell 1998

Chaenothecopsis cinerea Tibell – Reference: Tibell 1998

Chaenothecopsis lecanactidis Tibell – Reference: Tibell 1998

Chionosphaera cf. *apobasidialis* D.E. Cox – Reference: Etayo & Breuss 1998

Corticifraga fuckelii (Rehm) D. Hawksw. & R. Sant. – References: Etayo & Sancho 2008, Hawksworth & Santesson 1990

Cosmospora marelliana (Speg.) Etayo – References: Etayo 2003, Etayo & Rosato 2008

Dacampia rufescentis (Vouaux) D. Hawksw. – Reference: Wedin 1994

Dacampia xanthomendozae Etayo & Halici – Reference: Halici et al. 2009

Dactylospora australis Triebel & Hertel – Reference: Triebel 1989

Dactylospora frigida Hafellner – Reference: Hafellner 1985

Endococcus pseudocyphellariae Etayo – Reference: Etayo & Sancho 2008

Endococcus propinquus (Körb.) D. Hawksw. – Reference: Triebel 1989

Hemigrapha asteriscus (Müll. Arg.) D. Hawksw. – Reference: Diederich & Wedin 2000

Lasiosphaeriopsis stereocaulicola (Linds.) O.E. Erikss. & R. Sant. – Reference: Eriksson & Santesson 1986

Lichenodiplis lecanorae (Vouaux) Dyko & D. Hawksw. – Reference: Etayo & Breuss 1998

Lichenosticta alcicorniaria (Linds.) D. Hawksw. – Reference: Diederich 2003

Lichenostigma alpinum (R. Sant., Alstrup & D. Hawksw.) Ertz & Diederich – Reference: Wedin 1994

Lichenostigma maureri Hafellner (syn. *Phaeosporobolus usneae* D. Hawksw. & Hafellner) – References: Santesson 1994, Thor 1985

Microcalicium disseminatum (Ach.) Vain. (syn. *Microcalicium conversum* Tibell) – Reference: Tibell 1978
Nesolechia oxyspora (Tul.) A. Massal. – Reference: Etayo & Osorio 2004
Opegrapha sipmanii Matzer – Reference: Lücking et al. 2003
Phacopsis thallicola (A. Massal.) Triebel & Rambold – References: Clauzade et al. 1989, Etayo 2003, Etayo & Rosato 2008
Phacopsis usneae C.W. Dodge – Reference: Etayo & Sancho 2006
Plectocarpon latisporum Ertz, Diederich & Wedin – Reference: Ertz et al. 2005
Plectocarpon pseudoleuckertii Diederich, Ertz & Wedin – Reference: Ertz et al. 2005
Plectocarpon violaceum Ertz, R. Sant., Diederich & Wedin – Reference: Ertz et al. 2005
Polycoccum crassum Vězda – Reference: Etayo & Sancho 2008
Polycoccum infestans (Speg.) Etayo – Reference: Etayo & Rosato 2008
Polycoccum rugulosarium (Linds.) D. Hawksw. ex Pegler, Spooner & R.I. Lewis Sm. – Reference: Hafellner 2004a
Polycoccum vermicularium (Lindsay) D. Hawksw. – Reference: Hawksworth 1985
Pronectria subimperspicua (Speg.) Lowen – Reference: Santesson 1984
Rosellinula kalbii (Hafellner) Hafellner & R.W. Rogers – References: Hafellner 2004b, Kalb et al. 1995
Scutula nephromatis (Speg.) Etayo – Reference: Etayo & Rosato 2008
Skyttea lecanorae Diederich & Etayo – Reference: Diederich & Etayo 2000
Skyttea tephromelarum Kalb & Hafellner – Reference: Triebel 1989
Sphaerellothecium minutum Hafellner – References: Santesson 1998, Wedin 1994
Sphinctrina ophioparmae Kalb – Reference: Kalb 2001
Stigmidium peltideae (Vain.) R. Sant. – Reference: Etayo & Sancho 2008
Stigmidium ramalinae (Müll. Arg.) Etayo & Diederich – Reference: Etayo & Osorio 2004
Trichonectria australis Etayo – Reference: Etayo & Sancho 2008
Umbilithecium pseudocyphellariae Etayo – Reference: Etayo & Sancho 2008
Zwackhiomyces argentinae (Räsänen) D. Hawksw. & V. Atienza – References: Hawksworth & Atienza 1994, Räsänen 1941

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The lectotypification of *Acarospora trachytica* Jatta (Acarosporaceae), a rare species from Italy

KERRY KNUDSEN[1] & ANDERS NORDIN[2]

ABSTRACT. – *Acarospora trachytica* was described from Italy in the 19th century by Jatta. The name is lectotypified. It is recognized as producing norstictic acid and the description of the species is revised. Conidia are described for first time. *Acarospora trachytica* appears to be a rare Italian endemic.

KEYWORDS. – Biodiversity, endemic, lectotypification, taxonomy.

INTRODUCTION

Acarospora trachytica is typical example of a potentially rare endemic species that has become forgotten in the literature due to the lack of reported collections. It was described from Italy by Jatta (1882). Magnusson revised it in 1929 but cited only the two syntypes. It was not reported again from Italy until the late 20th century (Nimis 1993). It was included in the European key of Clauzade and Roux (1985) and the earlier reports were summarized by Nimis (1993). Nonetheless it is not included in the current Italian lichen checklist (ITALIC 2008) or in the recent European key for the genus (Roux 2007). During work reexamining *A. sphaerosperma* R.C. Harris & K. Knudsen (Knudsen et al. 2011), we revised this superficially similar species from Italy. A lectotype is designated and a revised description from the type is presented.

MATERIALS AND METHODS

The type specimen from UPS was studied with four sections made by hand using standard microscopy and a comparative literary analysis of Magnusson's description (Magnusson 1929). Secondary metabolites were studied with KOH and using standardized thin-layer chromatography in solvent C by J.C. Lendemer at NY following Culberson and Kristinsson (1970). Measurements were made in water and KOH. Amyloid reactions were studied with undiluted Lugol's (I), without pretreatment with KOH (K). The picture of the lectotype was taken with a Nikon Coolpix 4500.

THE SPECIES

***Acarospora trachytica* Jatta**, Nuovo Giorn. Bot. Ital. 14: 127. 1882. TYPE: **ITALY.** Ischia, sulla trachitica verde di Ischia, 1873, *N.A. Pedicino & G.C. Giordano s.n.* (UPS! lectotype **designated here**).

FIGURE 1.

DESCRIPTION. – *Thallus* rimose areolate, areoles 1–2 mm wide, up to ca. 0.7 mm thick, with usually one apothecium per areole, vegetatively dividing. *Upper surface* white (the pink color of the lectotype appears to be derived from a pigment in the substrate which can also be seen in the stone),

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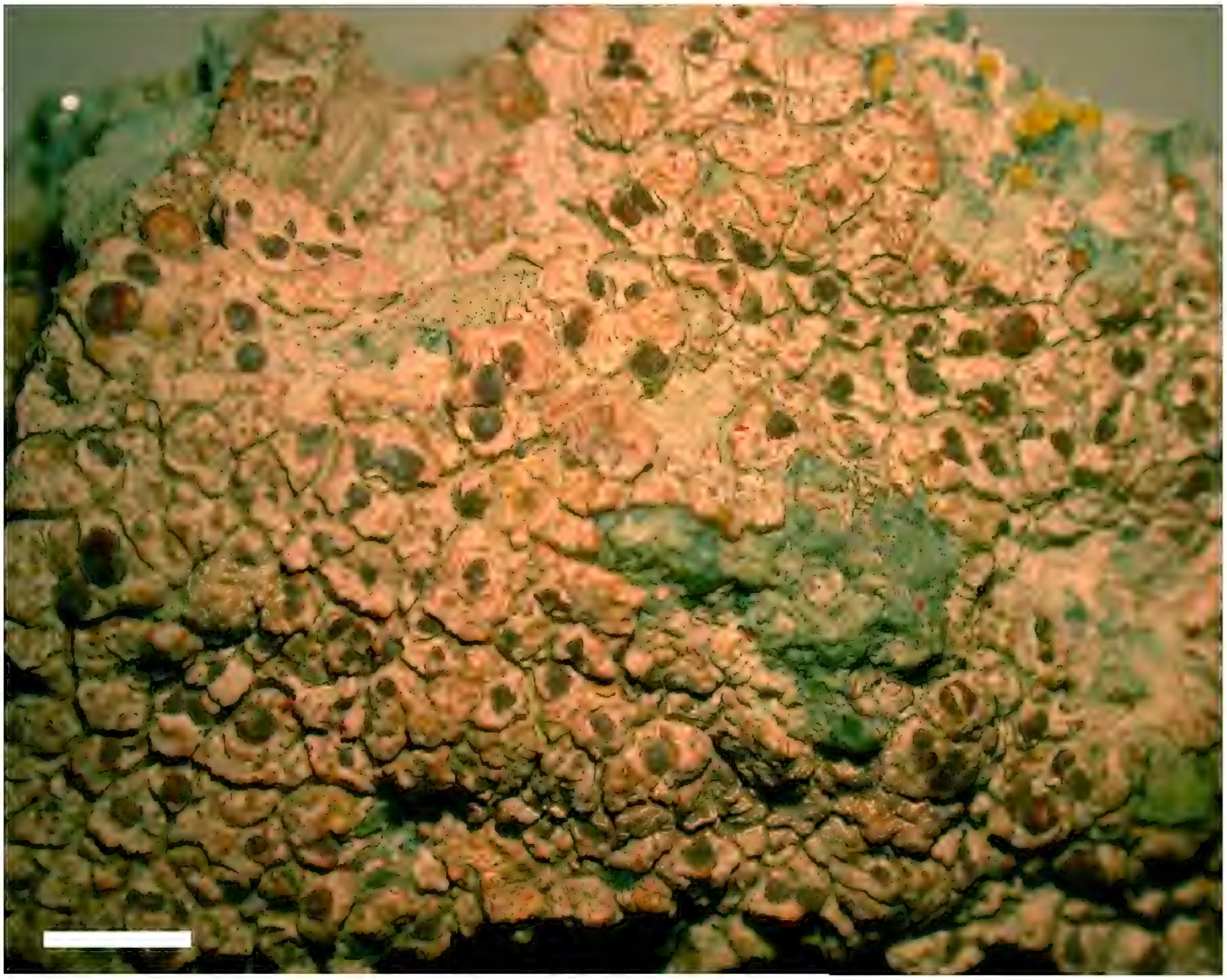

Figure 1, lectotype of *Acarospora trachytica* (UPS), scale bar = 2.0 mm.

rugulose, the areoles broadly attached, without a distinct lower surface. *Cortex* paraplectenchymatous, 30–40 µm thick, with an irregular epicortex up to 40 µm thick, whitish in thin upper layer, hyaline below, cortical cells 2–5 µm in width, inspersed with minute granules. *Algal layer* even, uninterrupted, 70–85 µm thick, algal cells 5–17 µm in diam., continuous beneath apothecium. *Medulla* 300–600 µm, heavily inspersed with crystals, continuous with attaching hyphae, 2–4 µm thick, smooth, thin-walled, and branching.

Apothecia usually one per areole, epruinose, round, plane becoming convex and elevated above thallus surface, reddish brown to reddish black, at maturity ca. 1 mm in diam., without distinct margin. *Exciple* indistinct. *Hymenium* 100–120 µm high, I+ blue, epihymenium reddish brown, paraphyses mostly 2 µm wide, apices barely expanded. *Subhymenium* deep, up to 150 µm. *Hypothecium* indistinct. *Asci* clavate, apical dome I-, 75–90 × 18–24 µm, ca. 50 ascospores per ascus. Ascospores globose, 4–6 µm in diam., or subglobose 4–6 × 4 µm. *Pycnidia* visible as pink dots, ca. 180 µm in diam. (only one measured), conidiogenous cells 10–15 × 1 µm, conidia simple, hyaline, mostly 2 × 1 µm.

CHEMISTRY. – Norstictic acid (present in the cortex and medulla). Spot tests: K+ yellow turning red (producing abundant needle-like crystals), C-, KC-, P+ yellow, UV-.

DISTRIBUTION AND SUBSTRATE. – The lectotype of *Acarospora trachytica* is on lightweight trachyte partially pigmented with a red mineral and the second syntype is on calcareous tufa (Jatta 1882). The species is currently known only from coastal Italy in the region of Naples.

DISCUSSION. – *Acarospora trachytica* could be confused with *A. murorum* A. Massal, which looks similar, but differs especially in its lack of secondary metabolites, higher hymenium, and larger ascospores

(Magnusson 1929). We look forward to new reports of this apparently rare endemic of Italy. Further taxonomic study is needed as well as molecular and phylogenetic analysis of fresh specimens. Its conservation status requires evaluation when extant populations are located.

ACKNOWLEDGEMENTS

We especially thank reviewer Zdenek Palice (PRA) for his invaluable comments. We thank James C. Lendemer (NY) for TLC analysis of the lectotype. The work of Kerry Knudsen was financially supported by the grant ''Environmental aspects of sustainable development of society'' 42900/1312/3166 from the Faculty of Environmental Sciences, Czech University of Life Sciences Prague.

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New and interesting lichens from Ontario, Canada – II

RICHARD TROY MCMULLIN[1], JOSE R. MALOLES[2] & STEVEN G. NEWMASTER[3]

ABSTRACT. – The lichen biota of Ontario has received considerable attention in recent years. Here we report more new species to the province and new records of infrequently reported species. *Pyrenopsis phaeococca* is new to Canada. Nine additional species are reported for the first time in Ontario: *Abrothallus caerulescens*, *Absconditella lignicola, Chaenothecopsis marcineae*, *Ephebe hispidula*, *Ephebe perspinulosa, Epilichen scabrosus, Mycoblastus affinis*, *Normandina pulchella*, and *Punctelia perreticulata*. Eighteen species are new provincial records of uncommon taxa: *Acarospora sinopica*, *Anisomeridium biforme*, *Bagliettoa baldensis*, *Calicium denigratum*, *Candelariella lutella*, *Chaenotheca laevigata*, *Chaenothecopsis nana*, *Cladonia incrassata*, *C. maxima*, *C. norvegica*, *Clypeococcum hypocenomycis*, *Dermatocarpon dolomiticum, Lathagrium undulatum*, *Lecanora albescens*, *Phaeophyscia kairamoi*, *Physconia subpallida*, *Spilonema revertens*, and *Xanthomendoza weberi*. Our records bring the number of lichens and allied fungi known from Ontario to 1,082.

KEYWORDS. – Great Lakes, northeastern North America, rare species, phytogeography.

INTRODUCTION

Ongoing research on the lichens and allied fungi that occur in Ontario, Canada (Fig. 1) has resulted in continued discoveries of species new to the province and new records of rarely reported species. Several recent studies have contributed to knowledge of the lichen biota in the province (Brodo et al. 2013, Lewis 2014, McMullin & Lendemer 2013, McMullin & Lewis 2014, McMullin et al. 2014, Schram et al. 2013). The first paper in the present series also contained new and interesting records for the province, as well as descriptions of the location of the province, its ecological regions and climate, and the history of lichen collecting up to that time (McMullin & Lewis 2013). Here we report on additional notable discoveries made in the province over the last two years.

MATERIALS AND METHODS

Identifications were made using standard chemical spot tests following Brodo et al. (2001). Thin-layer chromatography, following Culberson and Kristinsson (1970) and Orange et al. (2001), was used with solvents A and C to determine the chemistry of specimens that could not be reliably identified by morphology or spot tests alone. Specimens were deposited at the Biodiversity Institute of Ontario Herbarium (OAC) at the University of Guelph in Guelph, Ontario unless otherwise indicated.

Maps are provided based on digitized specimen data from 64 herbaria in North America (CNALH 2015). Non-digitized records from the Canadian Museum of Nature (CANL) and OAC were also included in the maps. All previous collections listed here were examined by the first author unless they were unavailable for a loan when requests were made to herbaria.

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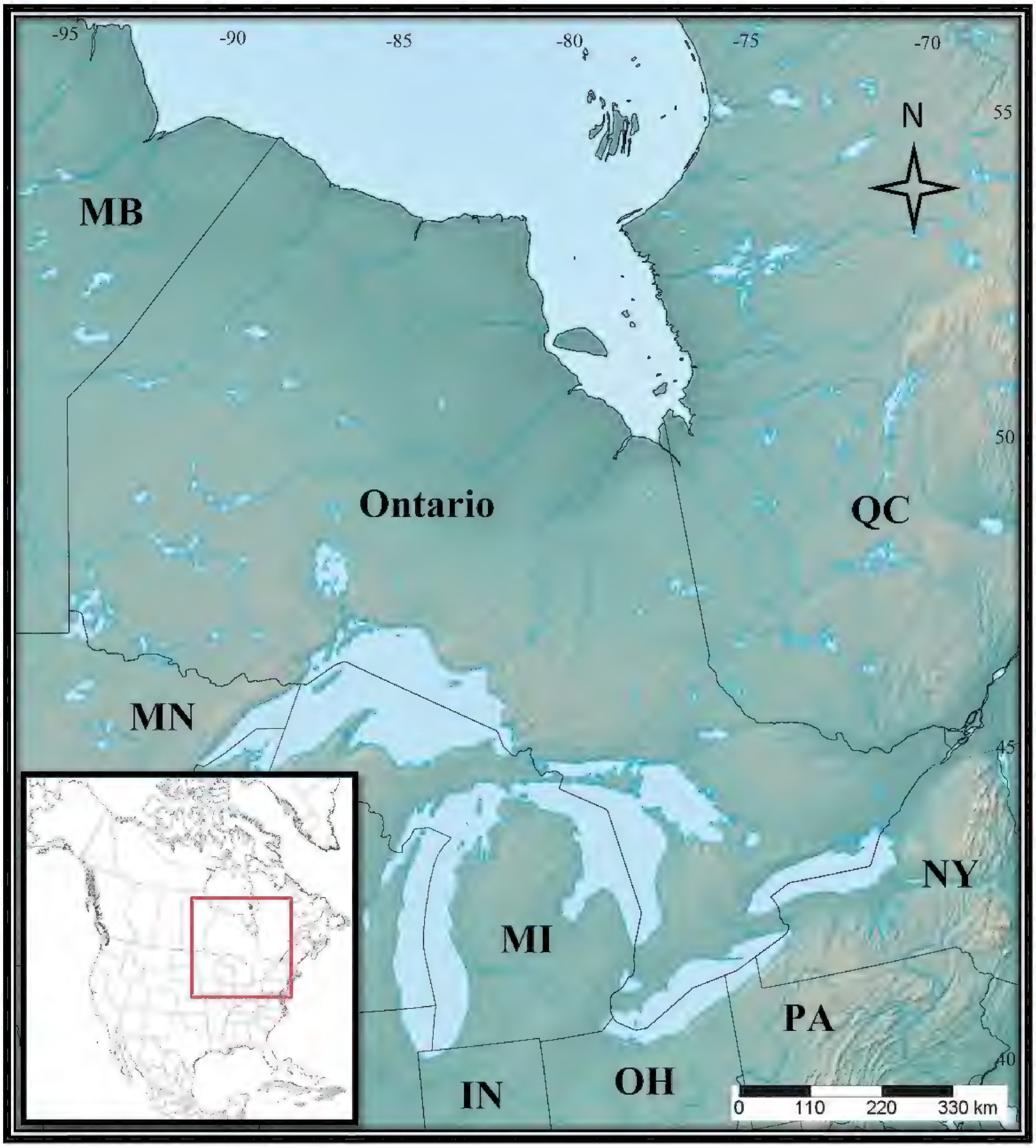

Figure 1, the Province of Ontario, including neighboring provinces and states.

RESULTS

Twenty-eight species of lichens and allied fungi are reported as new to the province or are new records of rarely collected species. *Pyrenopsis phaeococca* is new to Canada. Nine additional species are reported for the first time in Ontario: *Abrothallus caerulescens*, *Absconditella lignicola, Chaenothecopsis marcineae*, *Ephebe hispidula*, *Ephebe perspinulosa, Epilichen scabrosus, Mycoblastus affinis*, *Normandina pulchella*, and *Punctelia perreticulata*. Eighteen species are new provincial records of uncommon taxa: *Acarospora sinopica*, *Anisomeridium biforme*, *Bagliettoa baldensis*, *Calicium denigratum*, *Candelariella lutella*, *Chaenotheca laevigata*, *Chaenothecopsis nana*, *Cladonia incrassata*, *C. maxima*, *C. norvegica*, *Clypeococcum hypocenomycis*, *Dermatocarpon dolomiticum, Lathagrium undulatum*, *Lecanora albescens*, *Phaeophyscia kairamoi*, *Physconia subpallida*, *Spilonema revertens*, and *Xanthomendoza weberi*. Our records bring the number of lichens and allied fungi known from Ontario to 1,082 (Newmaster et al. in press).

NEW AND INTERESTING REPORTS

Records reported below were examined by the authors and are sorted alphabetically by genus and species. The species that is new to Canada is preceded by two asterisks ("**"), those reported for the first time in Ontario are preceded by one asterisk ("*"), and species preceded by a dagger ("†") are non-lichenized fungi traditionally treated with lichens. Species' names follow the 19th edition of the North American Lichen Checklist (Esslinger 2014); any deviance from that list reflects the opinion of the authors. Taxonomic authorities generally follow Brummitt and Powell (1996).

*†*Abrothallus caerulescens* Kotte

FIGURE 2A.

Our collection of *Abrothallus caerulescens* is the first from Ontario, which extends its known range westward in Canada. *Abrothallus caerulescens* is distinguished by growing on *Xanthoparmelia* spp., its black convex apothecia (<0.4 mm broad), a dark green-brown to black epihymenium that is KOH+ green, and verrucose ascospores that are brown, 2-celled, and <16 × <7 µm (Diederich 2003, 2004).

Specimen examined. – **CANADA. ONTARIO.** SIMCOE CO.: Awenda Provincial Park, Deer Camp Ground, on *Xanthoparmelia* on a granitic boulder, 3.vi.2013, *R.T. McMullin 13388* (NY).

**Absconditella lignicola* Vězda & Pisut

FIGURE 2B.

We report *Absconditella lignicola* for the first time in the province. It was first collected in southeastern Ontario in Frontenac County along Mackie Creek in 2008 (*Brodo 32239*, CANL). The second collection was made in Algonquin Provincial Park (*Brodo 32051*, CANL). The collection reported here extends its known range into the southwestern region of the province. *Absconditella lignicola* is an inconspicuous species with a thin, dark green, film-like thallus, with white to pale yellow apothecia that are often somewhat rounded and 0.1–0.2(–0.27) mm in diameter (Vězda & Pisut 1984). It has likely been overlooked in Ontario. The most similar species in the province is *Coenogonium pineti* (Schrad. *ex* Ach.) Lücking & Lumbsch, which has *Trentepohlia* as a photobiont instead of chlorococcoid algae, 1-septate ascospores instead of 3-septate, and larger apothecia (0.2–0.4 mm in diameter) that are more urceolate (Lücking et al. 2004, Benfield et al. 2009).

Additional specimen examined. – **CANADA. ONTARIO.** LAMBTON CO.: Municipality of Lambton Shores, Pinery Provincial Park, on Pine Trail southeast of Dunes Campground, on a moist and decorticate *Pinus* log in a closed forest of *Pinus resinosa* and *P. strobus* on sandy soil, 18.ix.2008, *D. Ladd 30151b* (hb. Ladd).

Acarospora sinopica (Wahlenb.) Körb.

FIGURE 2C.

Acarospora sinopica is reported from the fourth locality in Ontario and the first in the southwestern region of the province. The first collection was made along the Madawaska River in 1974 (*Brodo 20279*, CANL). Several specimens were then collected from Eagle's Nest Park in Bancroft, in 1989 (Wong & Brodo 1992) and in 2009 (*Lewis 312*, OAC). The third locality was in the Temagami District (*Lewis 496*, CANL). A preference for rocks with heavy metals such as iron, a uniformly rust-red areolate thallus with dark punctiform apothecia, and asci with >100 spores make *A. sinopica* a distinctive species (Fletcher et al. 2009).

Additional specimen examined. – **CANADA. ONTARIO.** SIMCOE CO.: Awenda Provincial Park, Stoney Point, on an iron-rich rock along the shore of Georgian Bay, 21.viii.2013, *R.T. McMullin 13233* (OAC).

Anisomeridium biforme (Borrer) R.C. Harris

FIGURE 2D.

There are three previous collections of *Anisomeridium biforme* in Ontario. The first two collections are from Renfrew County in 1985 at Kennelly's Mountain and Stubirski Lake (Wong & Brodo 1992). The third collection was reported from Crystal Bay in the Thunder Bay District (Crowe 1994). Our

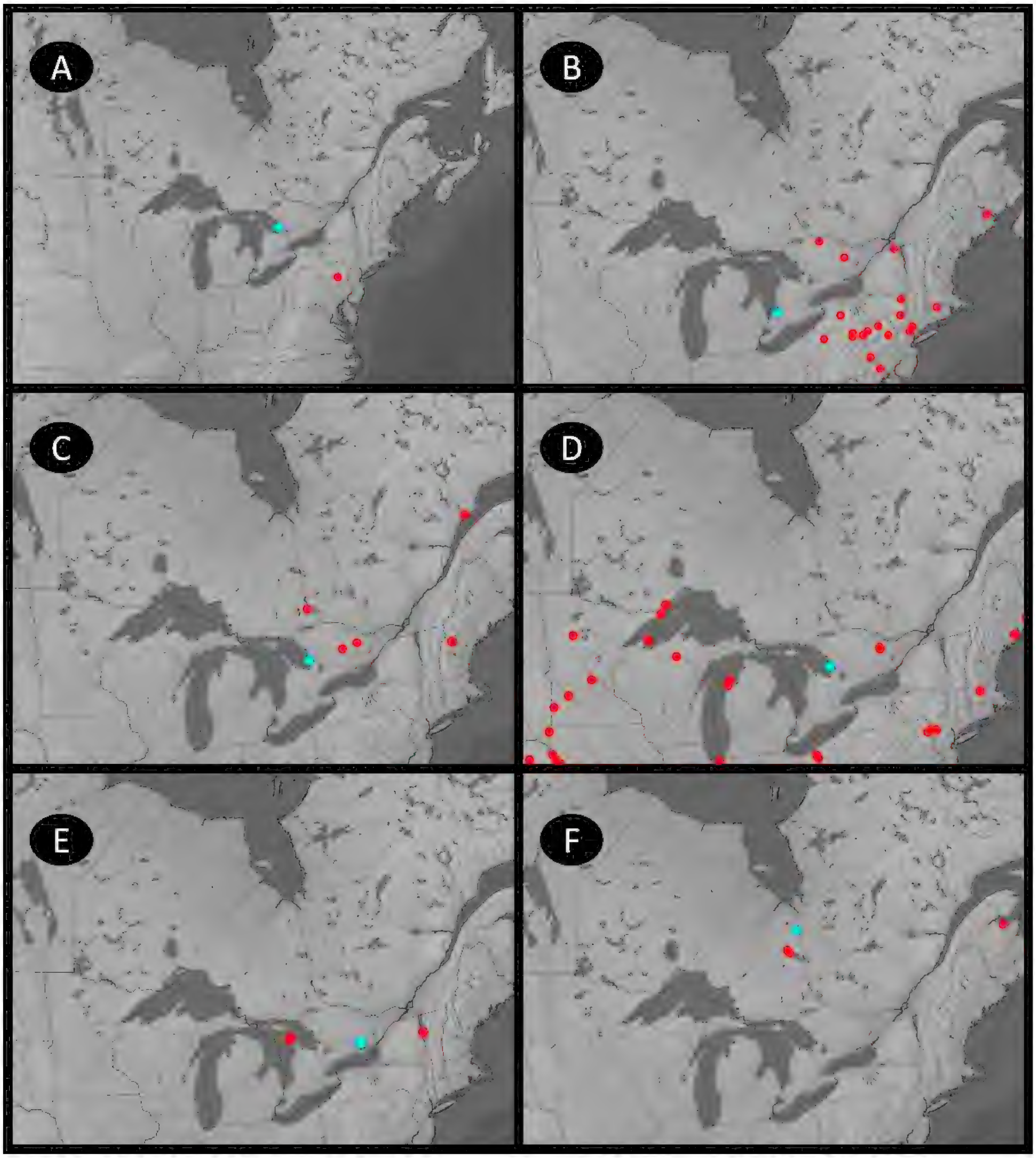

Figure 2, species distribution maps within Ontario and neighboring provinces and states (blue dots are new Ontario records and red dots are previous collections). A, *Abrothallus caerulescens*. B, *Absconditella lignicola*. C, *Acarospora sinopica*. D, *Anisomeridium biforme*. E, *Bagliettoa baldensis*. F, *Calicium denigratum*.

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collection is the fourth in the province and the first from southwestern Ontario. *Acrocordia cavata* (Ach.) R.C. Harris is similar in appearance, but it has ascospores with a verrucose instead of a smooth perispore (Harris 2015, Orange 2013). *Anisomeridium polypori* (Ellis & Everh.) M.E. Barr is also similar, but its perithecia are smaller (0.14–0.25 mm in diameter instead of 0.3–0.4[–0.5] mm), its pycnidia are often conical at the top (with a 'neck') instead of always lacking a 'neck', and its ascospores have one cell that is wider and longer than the other cell instead of being equal or one side being slightly shorter than the other (Harris 2015, Orange 2013).

Specimen examined. – **CANADA. ONTARIO.** SIMCOE CO.: Awenda Provincial Park, Giant's Tomb Island, in a *Quercus rubra* savanna, on *Acer saccharum*, 06.x.2013, *R.T. McMullin 13207* (OAC).

Bagliettoa baldensis (A. Massal.) Vězda

FIGURE 2E.

The first collections of *Bagliettoa baldensis* in Ontario were made by several people at the same location on the Bruce Peninsula during the 17th Tuckerman Workshop in 2008 (Brodo et al. 2013). Our collection is the second locality in the province. *Bagliettoa baldensis* is distinguished by a distinct white to pale grey thallus on calcareous rock, perithecia that are immersed in the rock with a small apical disk (a lid-like involucrellum), hyaline and simple ascospores, and the absence of paraplectenchymatous thallus tissue (Breuss 2007, Lendemer & Harris 2008, Orange 2013).

Specimen examined. – **CANADA. ONTARIO.** HASTINGS CO: Moira River Conservation Authority Lands, SE of Tweed, mature mixed-wood deciduous forest, on a limestone boulder, 19.x.2013, *R.T. McMullin 11892* (OAC).

Calicium denigratum Tibell

FIGURE 2F.

Calicium denigratum was first reported in North America from three localities in northeastern Ontario and one in New Brunswick (McMullin et al. 2012). We report a new collection from northeastern Ontario. This species differs from the morphologically similar and more common *C. abietinum* Pers. by having taller stalks (0.7–1.3 mm instead of 0.6–0.9 mm), a distinctive bell-shaped capitulum, and ascospores with a coarsely cracked, instead of warted, surface (McMullin et al. 2012, Tibell 1976).

Specimen examined. – **CANADA. ONTARIO.** COCHRANE DISTRICT: Iroquois Falls Forest North, Detour Lake Gold Mine, *Picea mariana* dominated bog with an open canopy, lignicolous (snag), viii.2013, *J.R. Maloles* 005 (OAC).

Candelariella lutella (Vain.) Räsänen

FIGURE 3A.

Thompson (1997) first reported *Candelariella lutella* from the province along the Kapiskau River near James Bay in northeastern Ontario. A second collection was made in 2008 from the Prescott and Russell United Counties in southeastern Ontario in the Larose Forest (*Brodo 32144*, CANL[n.v.]). McMullin and Lendemer (2013) reported the third collection, which was the first in southwestern Ontario. The collections reported here are additional records that include the second locality in the southwest. *Candelariella xanthostigma* (Ach.) Lettau is similar, but it has a uniformly granular, instead of areolate, thallus and the margins of its apothecia are granular or absent instead of entire and persistent (Westberg et al. 2011). *Candelariella vitellina* (Hoffm.) Müll. Arg. can also be similar, but it has larger thalli (up to several cm wide instead of <0.5 mm), larger apothecia (<0.8 mm in diam. instead of <0.4 mm), and it usually grows on rock instead of deciduous trees (Westberg et al. 2011).

Specimens examined. – **CANADA. ONTARIO.** SIMCOE CO: Awenda Provincial Park, Kettle Lake wetland at the start of Kettle Lake Stream, on branches of *Populus grandidentata* and *P. tremuloides*, 20.vii.2013, *R.T. McMullin 13146* (OAC), *R.T. McMullin 13147* (OAC). OTTAWA: Vincent Massey Park, mixed forest next to the Rideau River, on dead branch of a deciduous tree, 28.viii.2013, *C. Freebury 2181* (CANL).

Chaenotheca laevigata Nádv.

FIGURE 3B.

We report the fifth collection of *Chaenotheca laevigata* in Ontario and the first from southwestern Ontario. The first collection in the province was made in Emo in northeastern Ontario in 1901 (*Fink 745*, NY). The next collection was in 1959 at Racine Lake (*Erbisch 236*, MIN). The first southern Ontario collection was reported from Lanark County (Wong & Brodo 1992) and the fourth was from an old growth cedar stand near White Lake (Selva 2005). Several collections of *C. laevigata* have been made in Minnesota near the Ontario border, which suggests it may be more common in the northwestern part of the

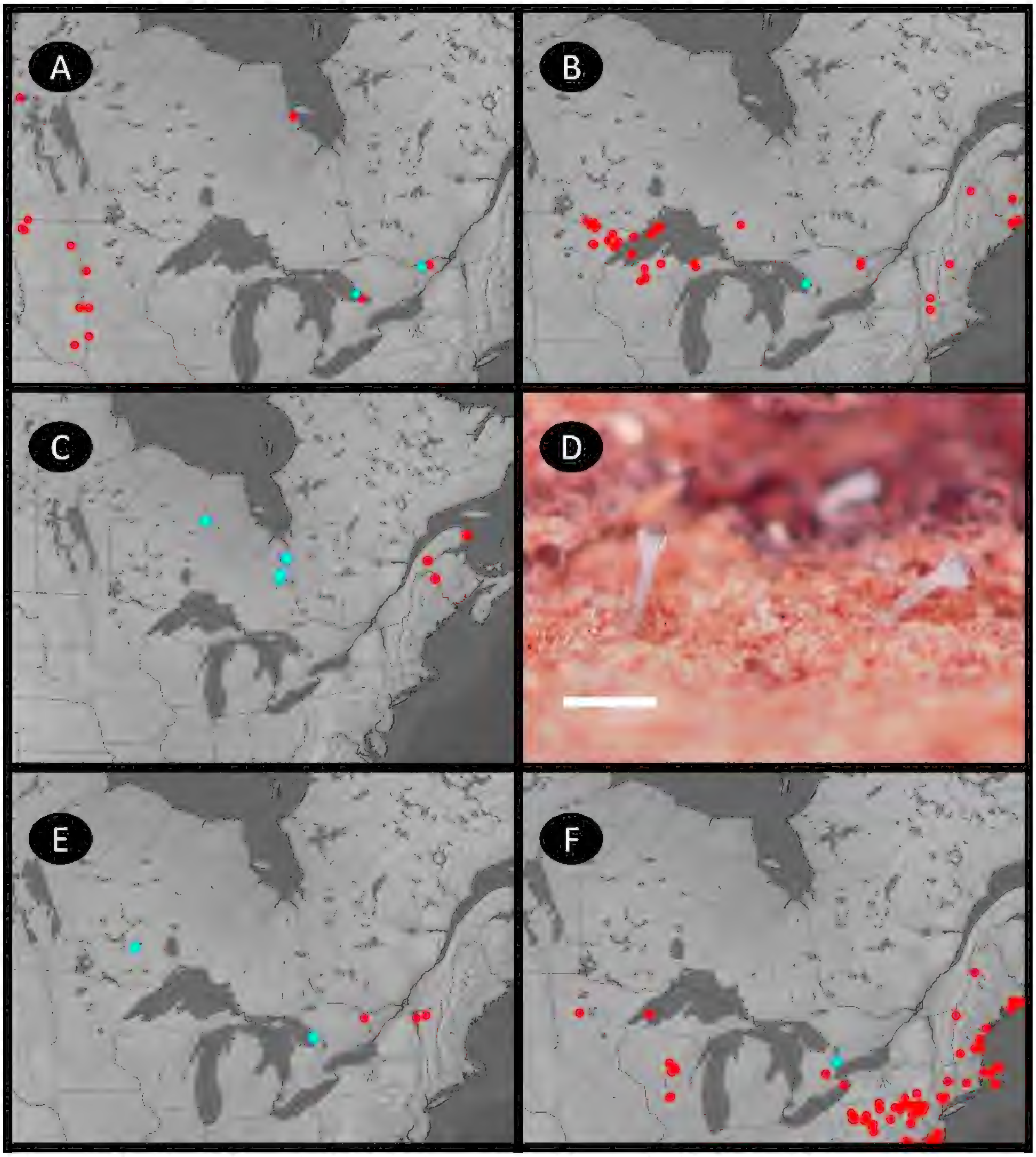

Figure 3, species distribution maps within Ontario and neighboring provinces and states (blue dots are new Ontario records and red dots are previous collections) with images of selected species. A, *Candelariella lutella*. B, *Chaenotheca laevigata*. C and D, *Chaenothecopsis marcineae* (map, C) and image (D) of *McMullin 14046* (scale = 0.2 mm). E, *Chaenothecopsis nana*. F, *Cladonia incrassata*.

province than collections indicate. *Chaenotheca chrysocephala* (Turner *ex* Ach.) Th. Fr. can be similar in appearance, as both species have yellow pruina on the capitulum, but *C. chrysocephala* has an intensely yellow thallus (containing vulpinic acid) instead of being immersed (Selva 2014, Tibell 1999).

Additional specimen examined. – **CANADA. ONTARIO.** SIMCOE CO.: Awenda Provincial Park, Giant's Tomb Island, interior old-growth *Thuja occidentalis* dominated forest, lignicolous (snag), 23.viii.2013, *R.T. McMullin 13207* (OAC).

*†*Chaenothecopsis marcineae* Selva

FIGURE 3C-D.

Selva (2013) described *Chaenothecopsis marcineae* from Maine, New Brunswick, and Québec. We report it here for the first time in Ontario from the boreal forest, where it appears to be common. All of our collections were made in mature stands where it was growing on the back of *Picea mariana* bark flakes on minute beads of resin. It was usually associated with *Microcalicium disseminatum* (Ach.) Vain., which colonized the top or front of the bark flakes that *C. marcineae* grew on. This distinctive species is characterized by a lack of photobiont, short apothecia (0.2–0.3 mm tall), resinicolous habitat, and an excipulum and stalk that are covered with a fine gray-white pruina (Selva 2013).

Specimens examined. – **CANADA. ONTARIO.** COCHRANE DISTRICT: Raven Township, Iroquois Falls Forest, 14.vii.2008, *R.T. McMullin 14027* (OAC); Stimson Township, Iroquois Falls Forest, 11.vii.2008, *R.T. McMullin 14026* (OAC); Iroquois Falls Forest North, Detour Lake Gold Mine, viii.2013, *J.R. Maloles* 001-003 (OAC), *J.R. Maloles 075-078* (UMFK, det. S. Selva). KENORA DISTRICT: Ring of Fire region,18.vii.2014, *R.T. McMullin 14046* (OAC); Ring of Fire region,14.vii.2014 *R.T. McMullin 14048* (OAC).

Chaenothecopsis nana Tibell

FIGURE 3E.

Chaenothecopsis nana was first reported from Ontario from the White Lakes Region (Selva 2005). We report three new collections that are the first records from northern and southwestern parts of the province. *Chaenothecopsis nana* is distinguished from other *Chaenothecopsis* species in Ontario by its KOH- stalks that are 0.4–0.6 mm tall, and dark brown, simple, fusiform spores that are obliquely arranged in the asci (Selva 2014, Tibell 1999).

Specimens examined. – **CANADA. ONTARIO.** KENORA DISTRICT: English River Forest, W of Sturgeon Lake along hwy 599, in mature mixed-wood conifer dominated forest, on a snag, 28.vii.2009, *R.T. McMullin 11273* (OAC); English River Forest, N of Sturgeon Lake along hwy 599, in mature mixed-wood conifer dominated forest, on a snag, 28.vii.2009, *R.T. McMullin 11352* (OAC). SIMCOE CO: Awenda Provincial Park, along main trail in the old-growth forest, on *Acer saccharum*, 19.viii.2013, *J.R. Maloles 008-009* (OAC, ver. S. Selva).

Cladonia incrassata Flörke

FIGURE 3F.

Cladonia incrassata was collected for the first time in Ontario in 1999 from the Wainfleet Bog Conservation Area in the Niagara Region (Olszewski 2010). We recently reported *C. incrassata* from the University of Guelph Arboretum (McMullin et al. 2014). Here we report the third collection in the province. *Cladonia incrassata* is distinguished from other red-fruited *Cladonia* species in Ontario by its short podetia (<0.5 mm tall) without cups, dense basal squamules that are usually sorediate, and its chemistry, which usually includes squamatic acid (KOH-, P-, and UV+ blue-white) and always includes usnic acid (KC+ dark yellow) (James 2009).

Specimen examined. – **CANADA. ONTARIO.** MUNICIPALITY OF TORONTO: Toronto Region Conservation Authority, Swan Lake Bog, on a moist stump, 25.v.2014, *R.T. McMullin 14139* (OAC).

Cladonia maxima (Asahina) Ahti

FIGURE 4A.

There are four previous collections of *Cladonia maxima* from Ontario. The first was from Mount Sherrick near James Bay in 1929 (*Potter s.n.*, F). Two additional collections were made in the Thunder Bay region (Crowe 1994) and another from the southern shore of James Bay (*Sims 533A*, CANL [n.v.]). Our collection is the fifth in the province. *Cladonia maxima* is distinguished in Ontario by usually lacking basal squamules and large podetia (<18 cm tall and <3 mm wide) that are P+ red (containing fumarprotocetraric acid), usually lacking atranorin (KOH-), esorediate, and pointed or with small cups (Hinds & Hinds 2007).

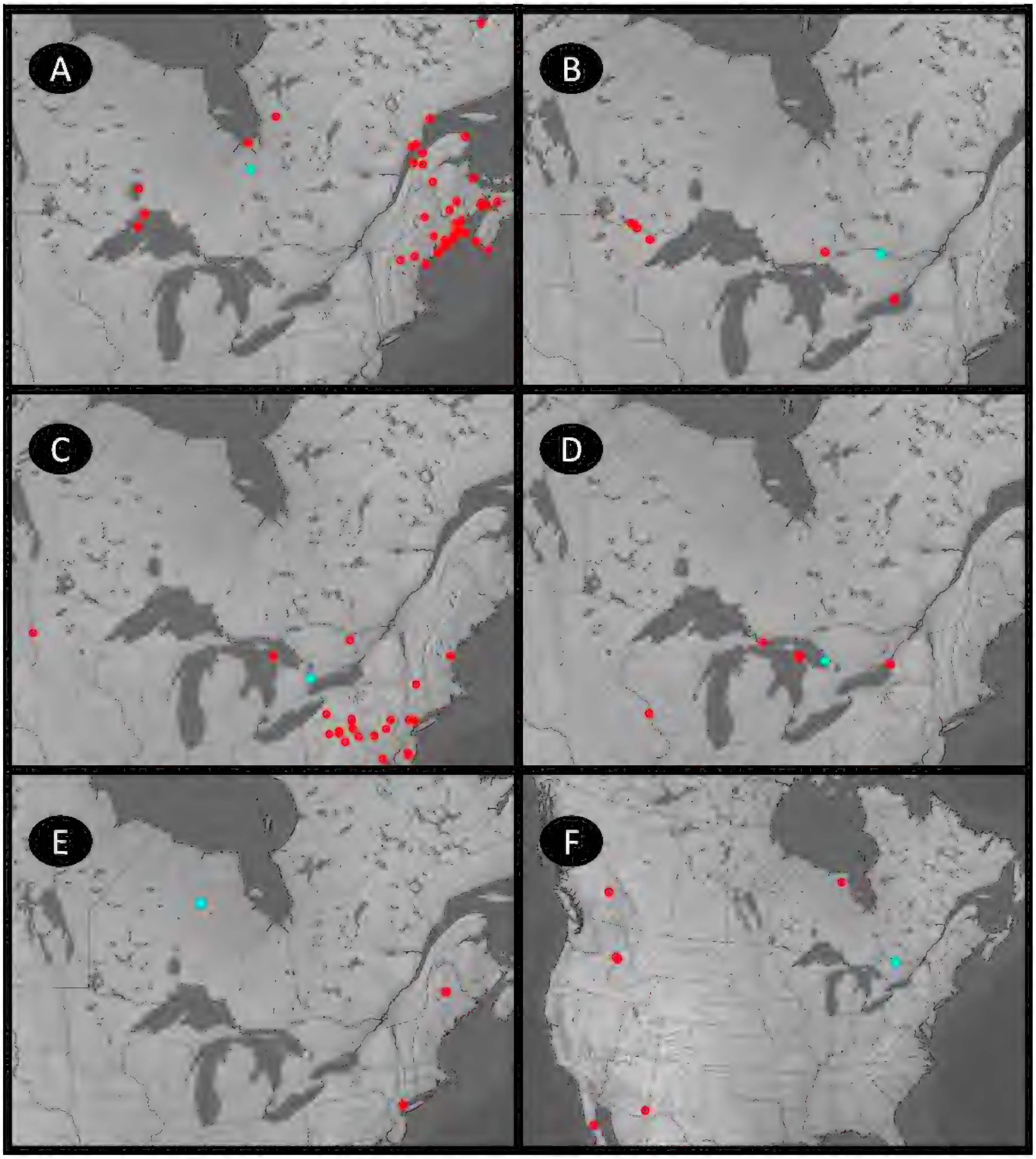

Figure 4, species distribution maps within Ontario and neighboring provinces and states (blue dots are new Ontario records and red dots are previous collections). A, *Cladonia maxima*. B, *Cladonia norvegica*. C, *Clypeococcum hypocenomycis*. D, *Dermatocarpon dolomiticum*. E, *Ephebe hispidula*. F, *Ephebe perspinulosa*.

Additional specimens examined. – **CANADA. ONTARIO.** COCHRANE DISTRICT: Iroquois Falls Forest North, Detour Lake Gold Mine, on mossy soil in a mature *Picea mariana* forest, viii.2013, [collected by J.R. Maloles] *R.T. McMullin 12702* (OAC).

Cladonia norvegica **Tønsberg & Holien**

FIGURE 4B.

The first report of *Cladonia norvegica* in Ontario was from the Greater Sudbury Area (Schram et al. 2013), and the second was from Sandbanks Provincial Park (McMullin & Lewis 2014). We report the next three collections, which extend the known range of *C. norvegica* eastward in the province. *Cladonia coniocraea* (Flörke) Spreng. and *C. ochrochlora* Flörke are similar and are often found growing with *C. norvegica*, but they contain fumarprotocetraric acid (P+ red, UV-) instead of barbatic acid (P-, UV+ blue-white) (Tønsberg & Holien 1984). Sterile specimens can also be difficult to distinguish from chemically identical specimens of *C. macilenta* Hoffm., which are usually easily differentiated by red instead of brown apothecia and pycnidia (Brodo et al. 2001, Hinds & Hinds 2007, Tønsberg & Holien 1984).

Specimens examined. – **CANADA. ONTARIO.** RENFREW COUNTY: Petawawa Research Forest, west of Racehorse Road and south of Baseline Road, in natural and managed mixed-wood forests, on the base of *Pinus resinosa* and *P. strobus*, 24.iv.2013 and 27.iv.2013 (all collected by L. Schram) *R.T. McMullin 14028* (OAC), *R.T. McMullin 14029* (OAC), *R.T. McMullin 14030* (OAC).

†*Clypeococcum hypocenomycis* D. Hawksw.

FIGURE 4C.

Clypeococcum hypocenomycis was previously collected twice in Ontario; once on the Bruce Peninsula in 2008 (Brodo et al. 2013) and again in Lanark county in 2011 (*Lendemer 28252*, NY). It is reported here for the third time from the province. Species of *Hypocenomyce* are the only known host for this lichenicolous fungus (Hawksworth 1980; Ertz 2004). It invades the upper algal layer and lower cortex of the host turning the surface brown to black (Hawksworth 1980; Ertz 2004). It is also distinguished by the apical beak of young asci, brown ascospores that are 2-celled and constricted at the septum, and apothecia that are black, globose, ostiolate, and clustered (Hawksworth 1980; Ertz 2004). *Clypeococcum hypocenomycis* likely follows the distribution of *Hypocenomyce* species, which are common in the province from southern Ontario to the north shore of Lake Superior.

Additional specimen examined. – **CANADA. ONTARIO.** MUNICIPALITY OF TORONTO: Toronto Region Conservation Authority, Swan Lake Bog, on *Hypocenomyce scalaris*, 25.v.2014, *R.T. McMullin 14124* (OAC).

Dermatocarpon dolomiticum Amtoft

FIGURE 4D.

Dermatocarpon dolomiticum was recently described from the Ozark Highlands in south-central United States by Amtoft et al. (2008). Those authors separated it from *D. miniatum* (L.) W. Mann, which, as traditionally applied in North America, encompassed a broad range of variation. In Ontario, the name *D. miniatum* had been widely used, but its distribution is now uncertain. The first locality that *D. dolomiticum* was reported from in Canada was the Bruce Peninsula (Brodo et al. 2013). Our collection is the second locality reported, but previous collections of *D. miniatum* may be *D. dolomiticum* and should be re-examined. *Dermatocarpon dolomiticum* is distinguished from other species in the province by being attached to its substrate by a single central holdfast, deeply dissected lobe margins, and perithecia that are <0.4 mm in diameter and immersed or level with the thallus (Amtoft et al. 2008).

Specimen examined. – **CANADA. ONTARIO.** SIMCOE CO: Awenda Provincial Park, 4th Beach, on a calcareous shoreline boulder, 24.viii.2013, *R.T. McMullin 13260* (OAC).

**Ephebe hispidula* (Ach.) Horw.

FIGURE 4E.

Ephebe hispidula has rarely been collected in North America. It is an Arctic and boreal species (Hinds and Hinds 2007). The nearest collection to the one reported here, however, is from Mt. Katahdin in Maine, a location known to host Arctic disjuncts (Hinds et al. 2009). *Ephebe perspinulosa* is similar, but its thallus is smaller (<0.5 cm instead of <3 cm in diameter), apothecia have a poorly developed exciple instead of a distinct one, and its asci have eight round ascospores instead of 16 ovoid ones (Jørgensen 2007c, Hinds & Hinds 2007, Schultz 2004).

Specimen examined. – **CANADA. ONTARIO.** KENORA DISTRICT: Along the Muketei River ~1 km from Camp Mukatei, on shoreline rocks, 14.vii.2014, *R.T. McMullin 14055* (OAC).

***Ephebe perspinulosa* Nyl.**

FIGURE 4F.

This is the first report of *Ephebe perspinulosa* in Ontario. One other collection is known from the province, which was made 133 km south of Hudson Bay along the Winisk River (*Oldham 37679n*, CANL). *Ephebe hispidula*, which is also reported here for the first time from Ontario, is similar. For differences, see discussion of that species above.

Additional specimen examined. – **CANADA. ONTARIO.** NIPISSING DISTRICT: Algonquin Provincial Park, High Falls, on exposed rocks near waterfalls, 02.ix.2013, *R.T. McMullin 12614* (OAC).

***†*Epilichen scabrosus* (Ach.) Clem. *ex* Hafellner**

FIGURE 5A.

Epilichen scabrosus is a lichenicolous fungus that occurs on *Baeomyces rufus* (Huds.) Rebent. (Gilbert & Hawksworth 2009). It has not been reported previously from Ontario or any neighboring provinces or states. It may have been overlooked in the past as its distribution likely corresponds with *Baeomyces rufus*, which is common and widespread in the province (Brodo et al. 2001). The areolate to subsquamulose patches of bright yellow-green thallus, black apothecia, and occurrence on *B. rufus* distinguish *E. scabrosus* from other species in the region (Gilbert & Hawksworth 2009).

Specimen examined. – **CANADA. ONTARIO.** KENORA DISTRICT: Hudson Bay Lowlands, Ring of Fire, in a mature conifer forest with sandy soil, on *Baeomyces rufus*, 18.vii.2014, [located by J. Doubt] *R.T. McMullin 14046* (OAC).

***Lathagrium undulatum* (Flot.) Otálora, P.M. Jørg. & Wedin**

FIGURE 5B.

We report the fourth locality for the isidiate form of *Lathagrium undulatum* (syn. *Collema undulatum* var. *granulosum* Degel.) in Ontario, which extends its range into the far northern region of the province. It was first collected on the eastern shore of Lake Superior (*Imshaug 22077*, MSC; *Henssen 14203*, CANL). A single collection was then made on Manitoulin Island (*Lewis 416*, CANL) and the third was on the Bruce Peninsula, where it was collected by several lichenologists during the 17th Tuckerman Workshop in 2008 (Brodo et al. 2013). The isidiate form of *L. undulatum* is distinguished in Ontario by its association with calcareous rock, 4-celled ascospores (although apothecia are rare), laminal isidia that are granular to globose, relatively narrow lobes (<5 mm wide and <300 µm thick), and a smooth upper surface where isidia do not occur (Hinds & Hinds 2007, Jørgensen 2007b).

Additional specimen examined. – **CANADA. ONTARIO.** KENORA DISTRICT: Hudson Bay Lowlands, Ring of Fire, along a creek ~200 m upstream from the Attawapiskat River, on thin soil over calcareous rock, 14.vii.2014, *R.T. McMullin 14059* (OAC).

***Lecanora albescens* (Hoffm.) Flörke**

FIGURE 5C.

This is the third collection of *Lecanora albescens* from Ontario. Śliwa (2007) reported the first two collections in the province from Rockcliffe Park near Ottawa and the Niagara Escarpment in Winona. *Lecanora albescens* is distinguished from other species in the *L. dispersa* complex by its 8-spored asci, POL+ granules in the epithecium that are insoluble in KOH or HNO_3, a distinct white thallus with somewhat lobate margins, and pale to brown, usually pruinose, apothecial disks (Śliwa 2007).

Specimen examined. – **CANADA. ONTARIO.** NIPISSING DISTRICT: Algonquin Provincial Park, Barron Canyon, on shoreline boulders, 03.ix.2013, *R.T. McMullin 12586* (OAC).

***Mycoblastus affinis* (Schaer.) T. Schauer**

FIGURE 5D.

Mycoblastus affinis is reported for the first time in the province. Two previous collections have been made from the eastern shore of Lake Superior in 1960 (*Imshaug 26016*, MSC) and the Kenora District in northern Ontario in 1983 (*Shchepanek & Dugal s.n.*, CANL). *Mycoblastus affinis* was encountered several times during research conducted by the first author in the Hudson Bay Lowlands and was likely overlooked in the past. *Mycoblastus sanguinarius* (L.) Norman and *M. sanguinarioides* Kantvilas are similar in appearance, but they are easily distinguished by a red layer beneath the hypothecium, which *M. affinis* lacks (Spribille et al. 2011).

Additional specimen examined. – **CANADA. ONTARIO.** KENORA DISTRICT: Hudson Bay Lowlands, Ring of Fire, fen, lignicolous (snag), 13.vii.2014, *R.T. McMullin 14052* (OAC).

***Normandina pulchella* (Borrer) Nyl.**

FIGURE 5E.

We report *Normandina pulchella* for the first time from Ontario. The first collection in the province was made on the Slate Islands in 1977 (*Wetmore 28925C*, MIN). The next collections were from Algonquin Provincial Park (*Lewis 395B*, *439*, CANL). *Normandina pulchella* can resemble the basal squamules of some *Cladonia* species, but it has more of a distinctive blue-green color and the squamules are more scattered, rounded, and have a thicker margin (Brodo et al. 2001). When fertile, *N. pulchella* can also be distinguished by its perithecia, multiseptate spores, and I+ red hymenial gel (Aptroot 1991, Orange 2013).

Additional specimen examined. – **CANADA. ONTARIO.** UNITED COUNTIES OF LEEDS AND GRENVILLE: Along the Saint Lawrence River, on the corner of Kerry Point Road and Narrows Lane Road, on a moist north facing sheltered cliff, on *Frullania*, 18.iii.2011, *R.T. McMullin 14032* (OAC).

***Phaeophyscia kairamoi* (Vain.) Moberg**

FIGURE 5F.

The first collection of *Phaeophyscia kairamoi* in the province was made on an island in Lake Nipigon in northern Ontario (*Macoun 878*, CANL). The next collection was made in southern Ontario 2.5 miles NE of Charles Lake in Grey County (*Wong 1965*, CANL). The third collection was reported from Flower Pot Island near the Bruce Peninsula (Brodo et al. 2013). We report the fourth and fifth localities in the province and extend its known range into eastern Ontario. *Phaeophyscia kairamoi* is distinguished by pale cortical hairs on the lobe surface and among coarsely granular soredia (Esslinger 1978). *Phaeophyscia hirsuta* (Mereschk.) Essl. is similar, and also has pale cortical hairs on the surface, but its soredia are finer and lack cortical hairs (Esslinger 1978).

Additional specimens examined. – **CANADA. ONTARIO.** MUNICIPALITY OF TORONTO: Rouge River Park, Woodland Trail, on *Acer nigrum*, 15.ix.2013, *R.T. McMullin 12537* (OAC). RENFREW COUNTY: Petawawa Research Forest, west of Racehorse Road and south of Baseline Road, in natural and managed mixed-wood forests, on *Populus tremuloides*, 26.iv.2013 [collected by L. Schram] *R.T. McMullin 14031* (OAC).

***Punctelia perreticulata* (Räsänen) G. Wilh. & Ladd**

Punctelia perreticulata is reported for the first time in the Ontario. It was previously collected once from the Slate Islands in Lake Superior in 1977 (*Wetmore 28210*, MIN). All other previous reports of *P. perreticulata* in the province are *P. caseana* Lendemer & Hodkinson. Due to misidentifications of this species, a distribution map has been omitted. *Punctelia caseana* is similar in appearance, but it has a smooth upper surface instead of scrobiculate, longer conidia (9–12 µm long instead of 6.5–8 µm), and lacks the pruina found on the lobe tips of *P. perreticulata* (Lendemer & Hodkinson 2010).

Additional specimen examined. – **CANADA. ONTARIO.** LAMBTON COUNTY. Municipality of Lambton Shores, Pinery Provincial Park, along Pine Trail, on *Juniperus virginiana*, 18.ix.2008, *D. Ladd 30150* (hb. Ladd).

****Pyrenopsis phaeococca* Tuck.**

FIGURE 6A-B.

This is the first confirmed report of *Pyrenopsis phaeococca* from Canada. A specimen was collected in 2012 from Parc National de la Gaspésie in eastern Québec that may be the same species (*Anderson 1590741*, QFA [examined by M. Schultz]), but it could not be confirmed. There is no modern

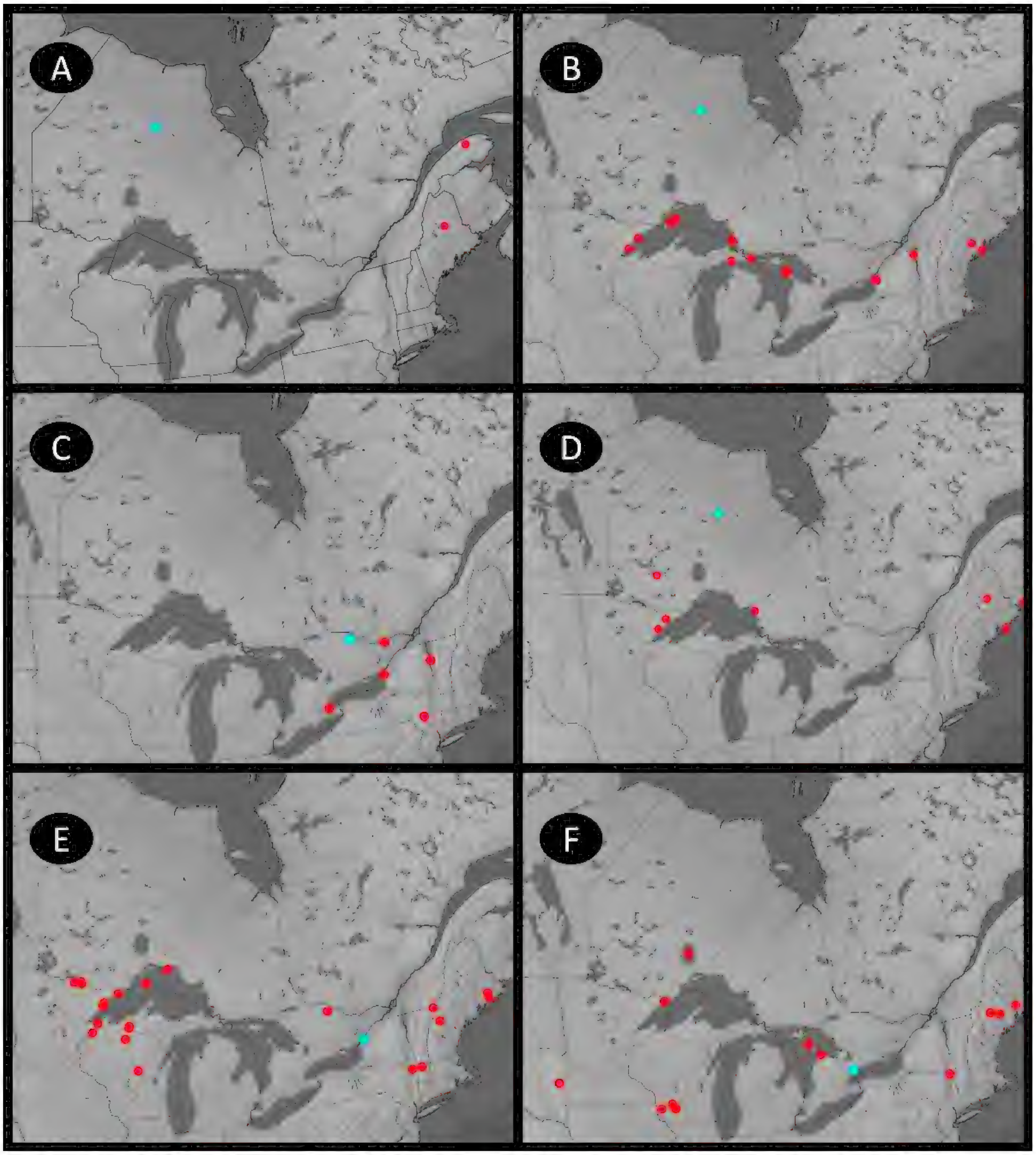

Figure 5, species distribution maps within Ontario and neighboring provinces and states (blue dots are new Ontario records and red dots are previous collections). A, *Epilichen scabrosus*. B, *Lathagrium undulatum*. C, *Lecanora albescens*. D, *Mycoblastus affinis*. E, *Normandina pulchella*. F, *Phaeophyscia kairamoi*.

treatment for *Pyrenopsis* in North America. Most of the sparse records from the United States are historical and need to be critically compared to European material (M. Schultz pers. comm.). *Pyrenopsis phaeococca* is distinguished in the province by its *Gloeocapsa* photobiont with a red to purple gelatinous sheath and ascogones and tricogynes beneath the pycnidia (Schultz 2007).

Specimen examined. – **CANADA. ONTARIO.** NIPISSING DISTRICT: Algonquin Provincial Park, Barron Canyon, on expose shoreline boulders (siliceous), 03.ix.2013, *R.T. McMullin 12782* (OAC).

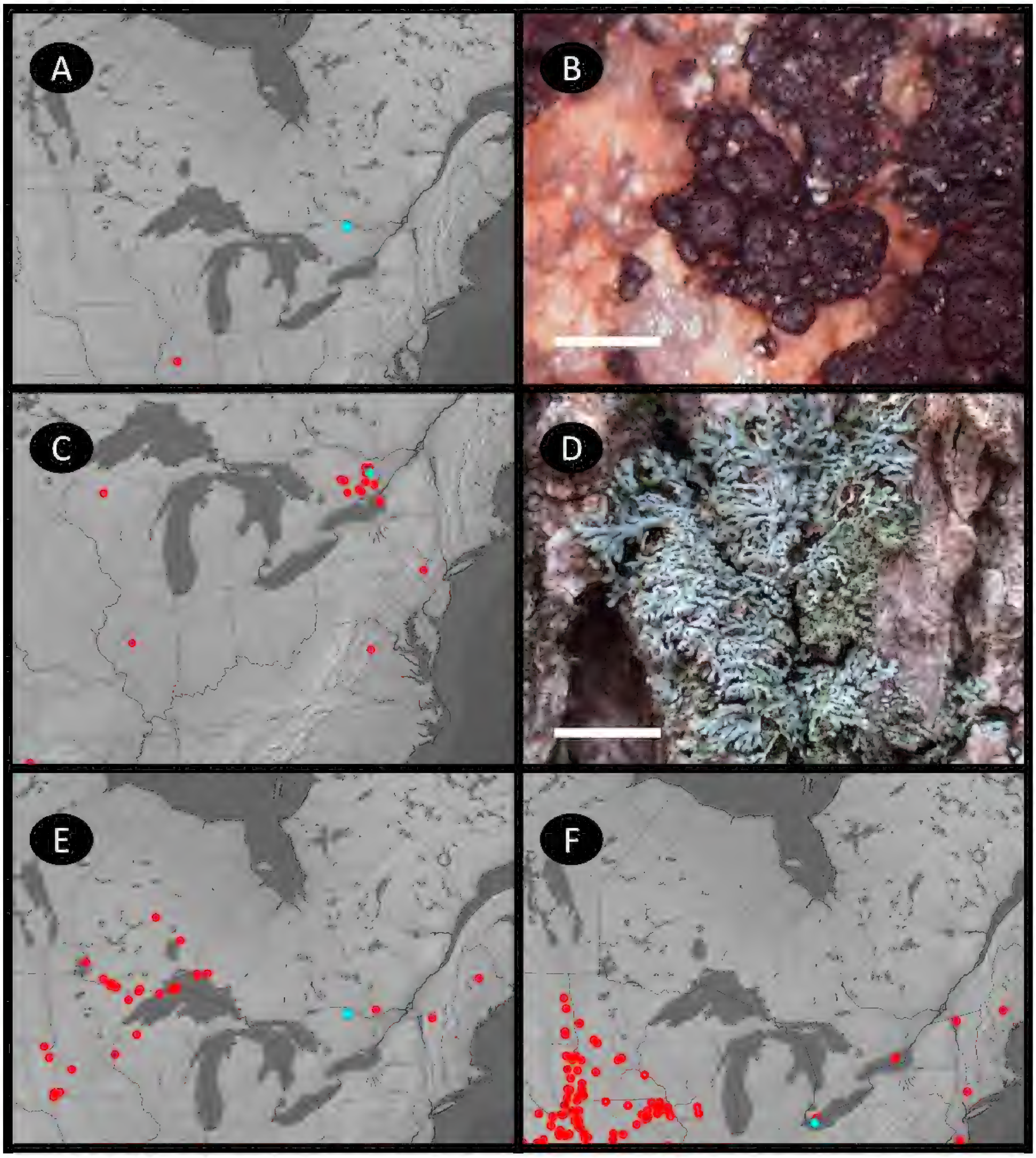

Figure 6, species distribution maps within Ontario and neighboring provinces and states (blue dots are new Ontario records and red dots are previous collections) with images of selected species. A and B, *Pyrenopsis phaeococca* (map, A) and image (B) of *McMullin 12782* (scale = 0.6 mm). C and D, *Physconia subpallida* (map, C) and image (D) *McMullin 11896* (scale = 1.3 cm). E, *Spilonema revertens*. F, *Xanthomendoza weberi*.

Physconia subpallida **Essl.**

FIGURE 6C-D.

Physconia subpallida is the only lichen federally listed as 'Endangered' in Ontario (Cleavitt & Werier 2009). The status assessment that led to its federal designation was based on four historical and two modern localities (Cleavitt & Werier 2009). Since the endangered designation was applied attention to this species has increased and it is now known from thirteen localities, all of which are in southeastern Ontario

(McMullin 2013). We report the most recent collection of this rare species. *Physconia subpallida* is distinguished from other species of *Physconia*, and the similar *Anaptychia palmulata* (Michx.) Vain., by its lack of isidia or soredia, pale lower surface, squarrose rhizines, and densely pruinose upper surface (Esslinger 1994, Hinds & Hinds 2007).

Specimen examined. – **CANADA. ONTARIO.** LANARK COUNTY: along Hwy 16, ~700 m E of Brownings Pond and ~2 km W of Robertson Lake, in a mature mixed-wood deciduous forest, corticolous, 03.ix.2013, *R.T. McMullin 11896* (OAC).

Spilonema revertens Nyl.

FIGURE 6C.

Four previous collections of *Spilonema revertens* were made in northwestern Ontario (Crowe 1994, Lewis 2014*)*. We report the fifth collection in the province and the first in southern Ontario. Our specimen was not growing with *Psorula rufonigra* (Tuck.) Gotth. Schneid., with which it often occurs (Jørgensen 2007a). *Thermutis velutina* (Ach.) Flot. can be similar in appearance, but its photobiont is *Scytonema* instead of *Stigonema* or *Hyphomorpha* (Jørgensen 2007a, Schultz 2002). Species of *Polychidium* may also be similar, but they have distinctly corticate lobes (Schultz 2002).

Specimen examined. – **CANADA. ONTARIO.** NIPISSING DISTRICT: Algonquin Provincial Park, Barron Canyon, on exposed shoreline boulders, 03.ix.2013, *R.T. McMullin 12781* (OAC).

Xanthomendoza weberi (S.Y. Kondr. & Kärnefelt) L. Lindblom

FIGURE 6D.

The first collections of *Xanthomendoza weberi* in Ontario were from Point Pelee National Park over a century ago (*Macoun 3641*, *3645*, CANL). The next collection was not until 2011 from Sandbanks Provincial Park (McMullin & Lewis 2014). Our reports are the next for the province and they confirm the continued presence of *X. weberi* in Essex County. It was locally common on Pelee Island, not located on Middle Island, and not searched for at the mainland part of Point Pelee Provincial Park where it was originally collected. *Xanthomendoza weberi* is a recent segregate from *X. fulva* (Hoffm.) Søchting, Kärnefelt & S. Kondr., which is the name that would have been applied to specimens from Ontario in the past (Lindblom 2006). Among the orange foliose lichens in Ontario *X. weberi* is distinguished by the presence of rhizines, erect and narrow lobes (<0.2–0.6 mm wide), dichotomous branching, and terminal soredia (Hinds & Hinds 2007, Lindblom 2006).

Additional specimens examined. – **CANADA. ONTARIO.** ESSEX COUNTY, Pelee Island, on Nature Conservancy of Canada property, ~50 m N of East West Road, on cement, 09.ix.2014, *R.T. McMullin 14042* (OAC); Pelee Island, On Nature Conservancy of Canada property, ~10 m N of East West Road, on *Fraxinus*, 09.ix.2014, *R.T. McMullin 14043* (OAC).

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A Review of *Physconia subpallida* in Canada

RICHARD TROY MCMULLIN[1]

ABSTRACT. – *Physconia subpallida* is one of five lichens formally listed as endangered in Canada and the only one that does not occur in a coastal province. All of its known Canadian sites are located in the province of Ontario. Since it was listed as endangered in 2009 search efforts have increased and new sites have been reported. To aid in further exploration and to better understand the distribution of *P. subpallida* in the country, the sites of all accessible modern reports were revisited and both habitat characteristics and population sizes were recorded. Images of mature thalli and habitats from all verified sites are presented. The results will help to enable individuals to recognize *P. subpallida* and its habitat, which will aid in the development of conservation and recovery strategies.

KEYWORDS. – Committee on the Status of Endangered Wildlife in Canada, Committee on the Status of Species at Risk in Ontario, phytogeography, conservation, rare species.

INTRODUCTION

Physconia subpallida Essl. is a foliose lichen that is endemic to eastern North America (Esslinger 1994). It has small to moderate-sized thalli (<8 cm in diameter) that are usually orbicular in outline. The upper surface color is gray to somewhat brown, but it is typically covered with a more or less uniform gray pruina. Lobes are usually elongated and discrete or becoming contiguous (<2.5 mm wide). Apothecia may be present or absent. Thalli lacking apothecia are often densely lobulate. Unlike most species in the genus, the lower surface is pale, varying from tan to white, but the rhizines are typical of *Physconia*, becoming darkened and squarrosely branched (Esslinger 1994).

In Canada, *Physconia subpallida* is one of five lichen species federally listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (hereafter abbreviated as COSEWIC) (COSEWIC 2009b). It is the only species with this designation that does not occur in a coastal province. The other lichens federally listed as endangered are either restricted to Atlantic Canada (i.e., New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island), *Erioderma pedicellatum pedicellatum* (Hue) P.M. Jørg. (COSEWIC 2002) and *E. mollissimum* (Samp.) Du Rietz (COSEWIC 2009a), or British Columbia, *Heterodermia sitchensis* Goward & W. Noble (COSEWIC 2006) and *Scytinium platynum* (Tuck.) Otálora, P.M. Jørg. & Wedin (COSEWIC 2011, Otálora et al. 2014). In Canada, *P. subpallida* is only known to occur in Ontario (Environment Canada 2015), where it was also provincially listed as endangered by the Committee on the Status of Species at Risk in Ontario in 2010 (Government of Ontario 2015). Its federal and provincial status assessments were based on two extant populations and four historical ones (COSEWIC 2009b, Government of Ontario 2015).

The global range of *Physconia subpallida* also includes the northeastern U.S.A. (Esslinger 1994, Hinds and Hinds 2007, COSEWIC 2009b). In 2009, 27 sites were known throughout its range, but only four were thought to be extant, two of which were in Canada (COSEWIC 2009b). Since *P. subpallida* received its endangered designations it has attracted greater attention and search efforts have increased in Canada, resulting in the discovery of 11 additional occurrences in Ontario (McMullin 2013), a provincial recovery strategy prepared by the Ontario Ministry of Natural Resources (Lewis 2011), and a federal recovery strategy (Environment Canada 2015).

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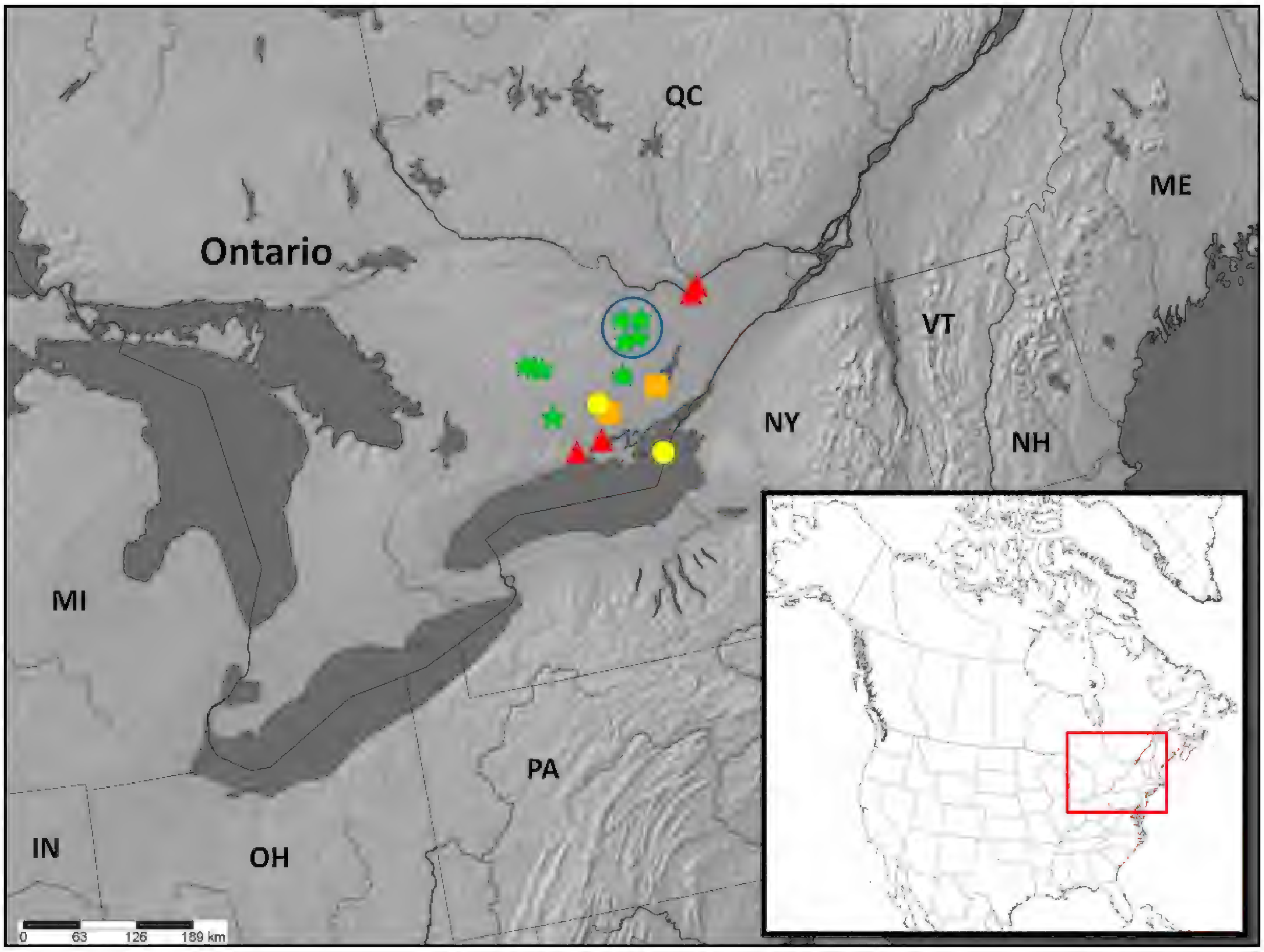

Figure 1, Location of all known *Physconia subpallida* sites in Canada. **Triangles** = historical sites**. Squares** = modern reports that were not refound. **Circles** = modern sites that are only accessible by boat. **Stars** = modern sites that were refound. **Circled area** contains the three largest populations.

The aim of this study was to better understand the current status and habitat of *Physconia subpallida* in Canada as well as to provide tools to assist and encourage additional search efforts. The objectives were to 1) visit all modern and accessible Canadian sites, 2) verify the continued existence of *P. subpallida* at sites where it was previously assessed, 3) determine population sizes at sites where it has been reported, but no population estimates are known to have been completed, 4) circumscribe the region where it is known to occur, 5) identify its habitat, and 6) obtain images of mature thalli at each site. The results will help to make the study of *P. subpallida* in Canada more accessible and assist conservation and recovery strategies.

MATERIALS AND METHODS

To verify previous collections and familiarize myself with *Physconia subpallida* before starting field work, I examined all specimens of the species at the Canadian Museum of Nature (CANL), the Farlow Herbarium (FH) at Harvard University, and the Biodiversity Institute of Ontario Herbarium (OAC) at the University of Guelph.

As of 10 October 2013, *Physconia subpallida* had been collected or reported from twelve modern and four historical sites in Canada. The four historical sites were based on five collections made by John Macoun in Belleville, Brighton, Britannia, and Ottawa over a century ago. The exact locations are uncertain and these areas have been heavily developed since the time of collection. During field work for their federal status report, N. Cleavitt and D. Werier explored some potential sites in these historical areas, but did not relocate *P. subpallida* (COSEWIC 2009b). Therefore, I did not revisit any historical areas. In addition, two modern sites, on Main Duck Island and along the Skootamatta River, were only accessible by boat, which was not available during the present study. The remaining ten modern sites were visited between 11 and 19 October 2013.

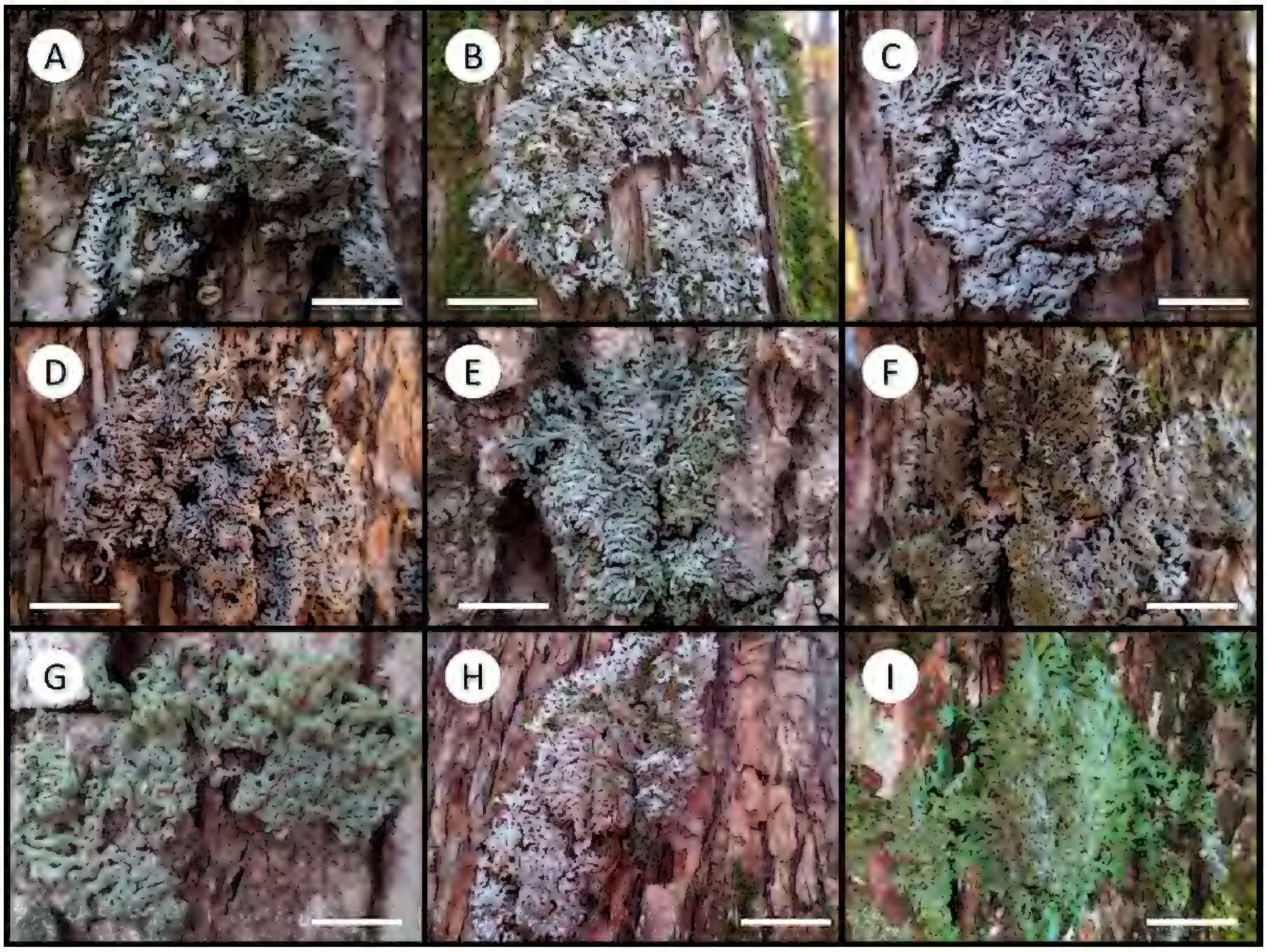

Figure 2, *Physconia subpallida* thalli from the nine sites that it was relocated. A, Arcol Road, scale = 2.5 cm. B, Billa Lake, scale = 3.5 cm. C, Calabogie Peak, scale = 2.5 cm. D, Halls Lake, scale = 2.75 cm. E, Highway 16, scale = 2.5 cm. F, Highway 118, scale = 2.75 cm. G, Lost Lake, wet, scale = 1.5 cm. H, Lower Paudash Lake, scale = 2.75 cm. I, Salmon River, wet, scale = 1.75 cm.

Two of the modern sites, Arcol Road and Billa Lake, had recently been thoroughly examined by N. Cleavitt, D. Werier, and several other lichenologists (COSEWIC 2009b). They recorded the substrate, number of thalli, the number of thalli with apothecia, and the number of trees colonized by *Physconia subpallida* at each site. A third site, Calabogie Peak, was also examined and the results were included in the recovery strategies (Lewis 2011, Environment Canada 2015). I revisited these three sites to verify the continued existence of *P. subpallida*, but I did not complete a comprehensive inventory of the populations.

At the other seven modern sites I attempted to relocate all previous reports of *Physconia subpallida*. I explored the area surrounding each occurrence to a minimum radius of 150 m. The number of thalli at each site was recorded, along with substrate, number of thalli with apothecia, and the number of trees colonized. Images of all thalli and habitats were captured using a Canon PowerShot Elph 320 IS digital camera. I also explored sites that appeared to have similar habitats to those where *P. subpallida* was found.

RESULTS

All the known Canadian sites for *Physconia subpallida* are concentrated in southeastern Ontario within a ~200 km^2 area (Fig. 1). I relocated the species at eight sites and discovered one new site (Fig. 1 and Table 1 in the Appendix). It was not successfully relocated at two sites, Clearwater Lake in Frontenac Provincial Park and Moira River Conservation Authority Lands off Deroche Line (Fig. 1). The three largest populations are at Arcol Road, Billa Lake, and Calabogie Peak (Fig. 1). To confirm the continued existence of *P. subpallida* at these three sites 2 of the 26 known thalli were relocated at Arcol Road (COSEWIC 2009b), 14 of the 26 were relocated at Billa Lake, and ~40 of the 71 were relocated at Calabogie Peak (Lewis 2009) (Fig. 1). The rest of the sites were thoroughly examined and all had four or fewer thalli (Table 1).

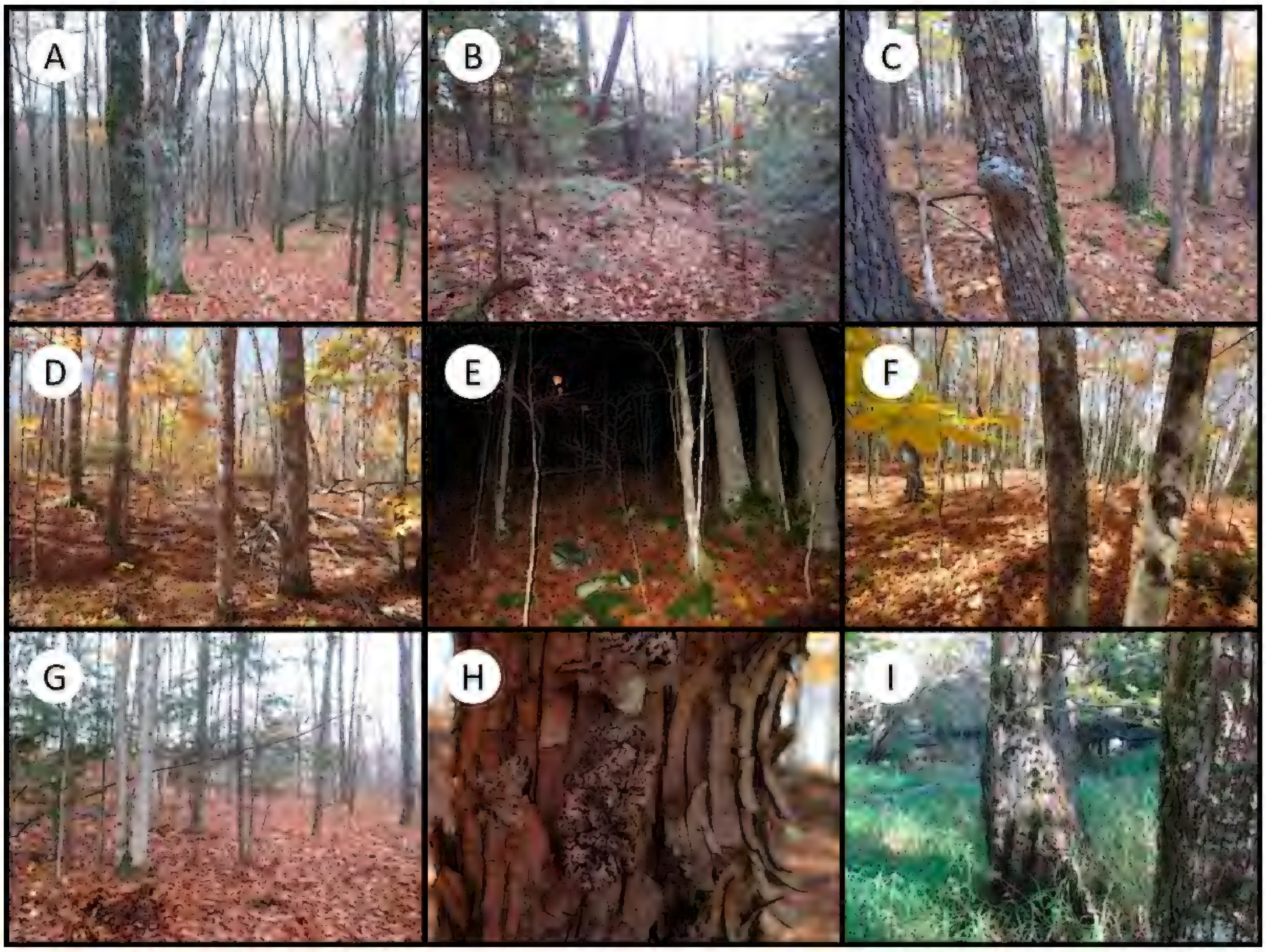

Figure 3, *Physconia subpallida* habitat at the nine sites where it was relocated. A, Arcol Road. B, Billa Lake. C, Calabogie Peak. D, Halls Lake. E, Highway 16, after night fall. F, Highway 118. G, Lost Lake. H, Lower Paudash Lake. I, Salmon River.

Images of mature thalli from each of the nine sites where *P. subpallida* was located are presented in Figure 2.

The habitat of eight of the nine sites was very similar (Fig. 3A-H). *Physconia subpallida* in Ontario typically colonizes old deciduous dominated forests with low stem density and a sparsely vegetated understory. All sites were in close proximity to water bodies, but not at the edge of the water, and consequently had high humidity. Thalli usually occurred in sheltered parts of the forest where wind and light were limited. Thalli were uniformly found on the trunks of trees above 0.5 meters and below 3 meters from ground level. They typically occurred on mature *Ostrya virginiana* with flaking bark (Fig. 3H), but the lichen was also found growing on the trunks of *Fraxinus* and *Populus* (Table 1). Historical collections of *P. subpallida* are also known from *Juglans nigra, Ulmus,* and rock (COSEWIC 2009b). The site at Salmon River differed from the other eight sites by not having any *O. virginiana*. Thalli occurred instead on *Fraxinus* directly beside the river, and the understory was densely vegetated (Fig. 3I). However, this site was similar in being an old-growth deciduous dominated forest with low stem density and high humidity.

The lichen species occurring most frequently on the same tree as *Physconia subpallida* were: *Bacidia rubella* (Hoffm.) A. Massal., *Phaeophyscia rubropulchra* (Degel.) Essl., *Physcia aipolia* (Ehrh. *ex* Humb.) Fürnr., and *Physconia detersa* (Nyl.) Poelt (Fig. 4C-F). The species found on trees in the immediate vicinity of *P. subpallida* at almost every site were *Myelochroa aurulenta* (Tuck.) Elix & Hale and *Punctelia rudecta* (Ach.) Krog (Fig. 4A-B). The thalli of these two species were typically robust and large, but were not usually found on the same tree as *P. subpallida*. Exposed rocks in this habitat were often colonized by cyanolichens including: *Leptogium cyanescens* (Rabenh.) Körb., *Scytinium lichenoides* (L.) Otálora, P. M. Jørg. & Wedin, *Nephroma parile* (Ach.) Ach., and *Peltigera neckeri* Hepp *ex* Müll. Arg.

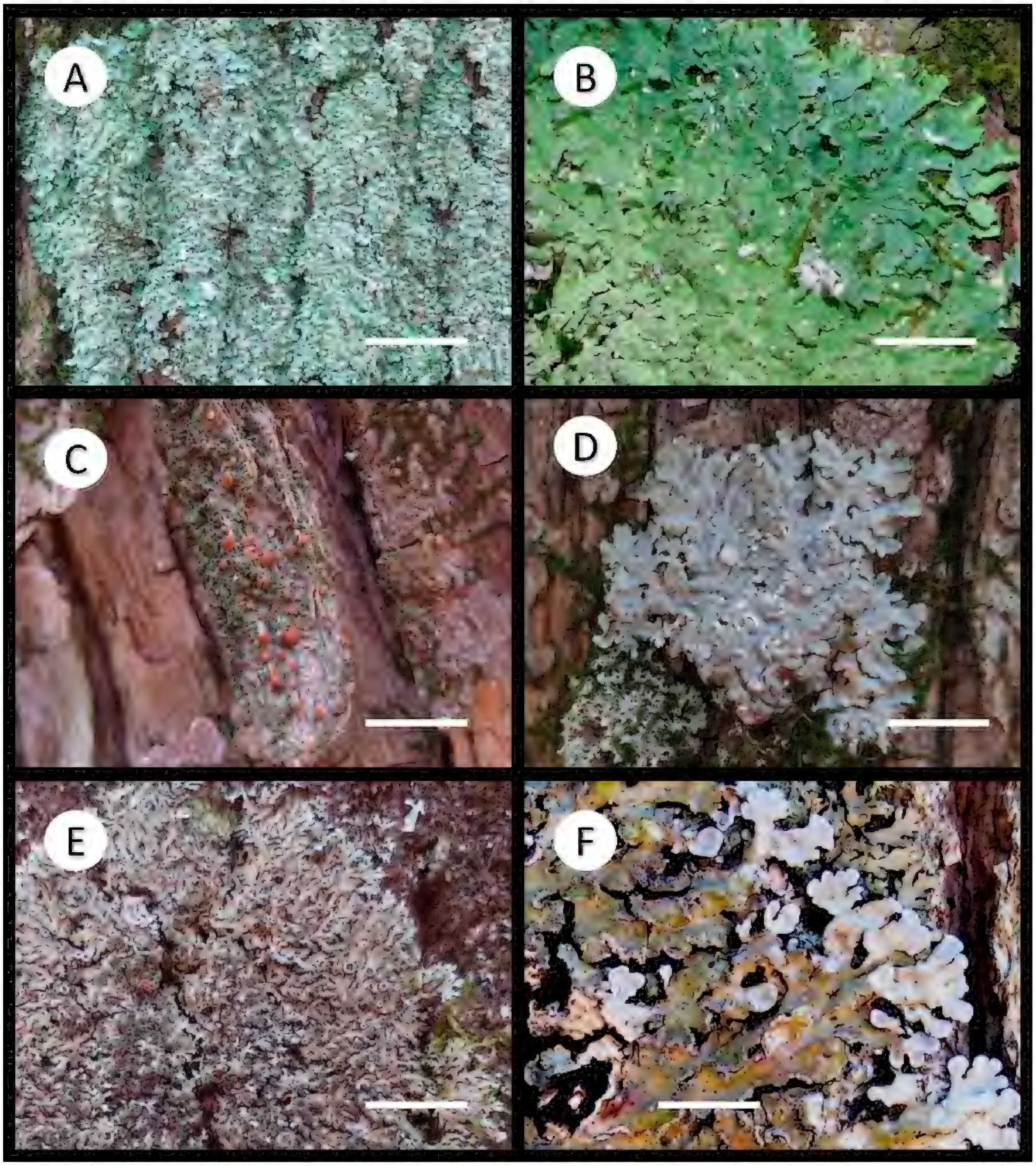

Figure 4, lichen species occurring in the vicinity of *Physconia subpallida* at nearly all sites (A & B), and most frequently found growing on the same tree as *P. subpallida* (C-F). A, *Myelochroa aurulenta*, scale = 5 cm. B, wet *Punctelia rudecta*, scale = 1.25 cm. C, *Bacidia rubella*, scale = 1.25 cm. D, *Physcia aipolia*, scale = 1 cm. E, *Phaeophyscia rubropulchra*, scale = 1.5 cm. F, *Physconia detersa*, scale = 0.5 cm.

Mature thalli had two growth forms, heavily lobulate (lobules minute to large) without apothecia (Fig. 2B,D,E-F,I) and less lobulate (lobules usually relatively large) with apothecia (Fig. 2A,C,G). Twenty-five (19%) of the 130 *Physconia subpallida* thalli known from Ontario produced apothecia (Table 1). Both forms were found at two of the sites, Arcol Road and Calabogie Peak, while the rest of the sites had only one of the two forms.

DISCUSSION

Physconia subpallida appears to be rare and in decline throughout its range (Esslinger 1994, COSEWIC 2009b, Environment Canada 2015). The discovery of at least 6 new Canadian sites in the last five years, however, suggests that our understanding of this species in the country is not complete. Further exploration in areas with potentially suitable habitat should be completed in southeastern Ontario and southwestern Québec. The development of predictive habitat models will be important for targeted search efforts as they have proven useful in documenting the full extent of the population for *Erioderma pedicellatum* in Nova Scotia and Newfoundland (Cameron & Neily 2008, Wiersma & Skinner 2011).

There are several lichen species similar to *Physconia subpallida* that occur within its Canadian range, *Anaptychia palmulata* (Michx.) Vain., *Physcia aipolia*, and other *Physconia* spp. *Anaptychia palmulata* has been frequently confused with *P. subpallida*. Over 100 herbarium specimens collected throughout northeastern North America were annotated as *P. subpallida* that were later re-examined and all were *A. palmulata* (Lendemer pers. comm.). *Anaptychia palmulata* is similar in its linear lobes and pale lower surface, but it differs in lacking pruina or only having pruina on the lobe tips instead of occurring throughout the upper surface. Furthermore, its rhizines are branched or sparsely squarrose instead of densely squarrose throughout. The lobules of *A. palmulata* also differ on the margins of the apothecia by growing towards the center of the disk instead of away from it.

Physcia aipolia can also appear similar. A form of *P. aipolia* occurred at all of the *Physconia subpallida* sites that differed from many descriptions of the species (e.g., Brodo et al. 2001, Hinds & Hinds 2007, McCune & Geiser 2009, Smith et al. 2009). These state that *P. aipolia* should have simple to furcate rhizines that are mostly pale, but I found that they were heavily furcate to irregularly squarrose and dark, and may appear somewhat similar to those of *P. subpallida* in the field. Nonetheless, they present a more ragged appearance than the densely squarrose rhizines of *Physconia*. *Physcia aipolia* is also similar in having a pale lower surface, pruinose apothecial disks, and it may have the appearance of pruina on the upper surface in the field, but it has well developed maculae instead of dense pruina. It also differs from *P. subpallida* by having less linear lobes that are shorter and wider, by having atranorin in the upper cortex and the medulla (KOH+ yellow instead of KOH-), and by lacking lobules, a character that is best observed on the margins of the apothecia (Thomson 1963).

Several other *Physconia* species occur in southeastern Ontario (Wong & Brodo 1992) and *Pysconia subpallida* always occurred with one or more of these species. They usually have a densely pruinose upper surface that makes them appear similar to *P. subpallida*, but they are all sorediate and have a dark lower surface (Esslinger 1994, Brodo et al. 2001).

The new discoveries of *Physconia subpallida* in the last five years have been made by myself, as well as by C. Lewis and S. Brinker of the Ontario Ministry of Natural Resources and Forestry. The descriptions and figures presented here should enable, and hopefully encourage, a greater number of individuals to look for and recognize this endangered species in Canada and throughout its range in eastern North America.

ACKNOWLEDGEMENTS

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APPENDIX – TABLE 1: POPULATION CHARACTERISTICS OF *PHYSCONIA SUBPALLIDA* AT ALL SITES VISITED FOR THE PRESENT STUDY

Site	Location	Refound	Substrate(s)	Number of trees	Number of Thalli	Number of fertile thalli	Reference
1	Arcol Road	Yes	*Ostrya virginiana*	8	26	5	COSEWIC 2009b
2	Billa Lake	Yes	*Ostrya virginiana*	8	19	1	COSEWIC 2009b
3	Calabogie Peak	Yes	*Ostrya virginiana*	Unknown	71	16	Lewis 2009
4	Deroche Line	No	-	-	-	-	
5	Clearwater Lake	No	-	-	-	-	
6	Halls Lake	Yes	*Ostrya virginiana*	1	4	2	
7	Highway 16	Yes	*cf. Populus grandidentata*	1	1	0	
8	Highway 118	Yes	*Ostrya virginiana*	1	1	0	
9	Lost Lake	Yes	*Fraxinus* sp.	1	1	1	
10	Lower Paudash Lake	Yes	*Ostrya virginiana*	2	4	0	
11	Salmon River	Yes	*Fraxinus* sp.	1	3	0	

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A nomenclatural note on *Mycoporum biseptatum* (basionym *Arthonia biseptata*)

JAMES C. LENDEMER[1] & RICHARD C. HARRIS [2]

ABSTRACT. – *Arthonia biseptata* Degel., the basionym of the combination *Mycoporum biseptatum* (Degel.) R.C. Harris & Lendemer, is shown to be an illegitimate later homonym of *A. biseptata* Vain. As there is no obstacle under the Code precluding the use of the epithet "biseptatum" in *Mycoporum*, *M. biseptatum* is treated here as a replacement name for *A. biseptata* Degel. with the author citation corrected to "R.C. Harris & Lendemer". The status of *A. biseptata* Degel. as an illegitimate later homonym is shown to have been previously overlooked due to an indexing error in 1924 that was subsequently perpetuated in online indexes of fungal names.

KEYWORDS. – Endemism, Great Smoky Mountains, southern Appalachian Mountains, pyrenolichen.

INTRODUCTION

Degelius (1941) introduced the name *Arthonia biseptata* Degel. to accommodate a new crustose species that he found growing on bark at high elevations of Great Smoky Mountains National Park in southeastern North America. The taxonomic identity of this species remained unclear until recent biodiversity inventory efforts in the same region led to the first modern collections of the species (see Lendemer et al. 2013). Study of these collections and the type material led to the recognition that the taxon was actually a member of the genus *Mycoporum* G. Mey., leading to the publication of the combination *M. biseptatum* (Degel.) R.C. Harris & Lendemer (Lendemer & Harris 2014).

As part of our revision of *Mycoporum biseptatum* we noted that the species appeared to be rare and narrowly endemic to the high elevations of the southern Appalachian Mountains (Lendemer & Harris 2014). The apparent rarity and restricted distribution of *M. biseptatum* subsequently prompted its assessment under the IUCN Red List Guidelines (IUCN 2014). In the process of preparing the preliminary assessment for the species however, the first author came across a record tagged as *"Arthonia biseptata* Vain." in the Consortium of North American Lichen Herbaria (CNALH) that belonged to Vainio's *Lichenes Brasiliensis No. 84*. Initially it was assumed that the name under which the specimen had been databased was in error. However, a search of the literature revealed that in fact the specimen was distributed under that name, and that *A. biseptata* Vain. was validly published by Vainio (Wainio 1890) for an unrelated species from Brazil.

Since *Arthonia biseptata* Vain. is a legitimate name validly published in 1890, *A. biseptata* Degel. is an illegitimate later homonym. Following Art. 58.1 of the ICN (McNeill et al. 2011), since there is no obstacle precluding the use of the epithet "biseptatum" in *Mycoporum*, the combination published in Lendemer & Harris (2014) may be treated as a replacement name for the illegitimate *A. biseptata* Degel. (see the nomenclature section below). When we initially researched *A. biseptata* Degel. we noticed that there was a similar name listed in Index Fungorum as *A.* "*bisepta*" Vain., but assumed that it was simply an

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unrelated epithet with different a spelling. Evidently *A. biseptata* Vain. was incorrectly indexed by Zahlbruckner (1924) in his *Catalogus* with the spelling "bisepta", and the misspelling was subsequently perpetuated in online databases such as Index Fungorum and MycoBank. Although not unusual, the issue uncovered here serves to illustrate that bibliographic research remains central to nomenclature in the age of mass digitization, databases, and indexing. Concurrently, it highlights the value of large-scale efforts to digitize museum collections, as were it not for the discovery of a record in CNALH with the name *A. biseptata* Vain., we would not have questioned the status of *A. biseptata* Degel.

NOMENCLATURE

***Mycoporum biseptatum* Lendemer & R.C. Harris,** Castanea 79: 108. 2014.
MycoBank #808485.

≡ *Arthonia biseptata* Degel. *nom. illeg.* (non *A. biseptata* Vain., Étud. Class. Lich. Brésil, 2: 159. 1890), Arkiv. Bot. 30A(3): 22. 1941. TYPE: **U.S.A. NORTH CAROLINA.** SWAIN CO.: GSMNP, Forney Ridge, 1760 m., 13.ix.1939, on *Viburnum alnifolium*, *G. Degelius s.n.* (UPS [L-68873]!, holotype).

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Notes on the California Lichen Flora 7: More New Records

JANA KOCOURKOVÁ[1] & KERRY KNUDSEN[2]

ABSTRACT. – *Arthonia protoparmeliopseos* is reported new for North America and California. *Candelariella immarginata*, *Lichenostigma dimelaenae, Rinodina guzzinii, Stigmidium gyrophorarum,* and *Tetramelas pulverulentus* are reported new for California.

KEYWORDS. – lichenicolous fungi, Joshua Tree National Park, San Bernardino Mountains, Santa Cruz Island, White Mountains.

INTRODUCTION

Six species including one lichen (*Rinodina guzzinii*) and five lichenicolous fungi (*Arthonia protoparmeliopseos*, *Candelariella immarginata*, *Lichenostigma dimelaenae*, *Stigmidium gyrophorarum*, and *Tetramelas pulverulentus*) are newly reported for California. Based on the current literature these taxa are not already known to occur in the state (Hutten et al. 2013, Kocourková et al. 2012, Tucker 2013). *Arthonia protoparmeliopseos* is also reported new for North America. *Lichenostigma dimelaenae, Stigmidium gyrophorarum,* and *Tetramelas pulverulentus* are reported from the San Bernardino Mountains and Joshua Tree National Park. *Candelariella immarginata* and *Rinodina guzzinii* are from the White Mountains in Inyo National Forest and are members of the lichenized and lichenicolous fungi biota of the Basin and Range Province. Like the two species we report, the species of this biota are usually distributed from Nevada and northern Arizona to Utah and farther inland but only occur in southern and central California along the eastern border of the state in the Mojave Desert, the eastern Sierra Nevada Mountains and the White Mountains.

MATERIALS AND METHODS

Specimens used in this study are deposited in SASK, UCR, and the personal herbarium of Kocourková and Knudsen. Specimens were analyzed with standard microscopy with hand sections mounted in water. Secondary metabolites were tested with KOH (K). Amyloid reactions were studied with Lugol's iodine (I), with or without pretreatment with K.

THE SPECIES

1. *Arthonia protoparmeliopseos* Etayo & Diederich

NOTES. – *Arthonia protoparmeliopseos* was described from Luxembourg and Spain as a lichenicolous fungus on the thallus of *Lecanora muralis* (Schreb.) Rabenh. It has an I+ red hymenium and 1–2 septate ascospores 10–14.5(–15) × (3.5–)4.0–5.5(–6.0) µm in size, that are hyaline and obovate. For a taxonomic description and illustrations see Etayo & Diederich (2009). It was collected several times in

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Aragon in Spain (Etayo 2010) and was recently reported from Turkey in Asia (Yazici & Etayo 2014). The species is reported new for North America and California.

Specimen examined. – **U.S.A. CALIFORNIA.** SANTA BARBARA CO.: Santa Cruz Island, Channel Islands National Park, Mountain Ridge Trail near old oil rig, 34°2′2.4″N 119°34′4.4″W, 239 m, 29.vii.2012, on *Lecanora muralis* on basalt, *J. Kocourková 8164 & K. Knudsen* (hb. Kocourková & Knudsen).

2. *Candelariella immarginata* M. Westb.

NOTES. – *Candelariella immarginata* is lichenicolous on *Aspicilia* species and pyrenocarpous lichens. For illustrations and a description see Westberg (2007) and Westberg & Nash (2008). The species was collected on an *Aspicilia* species in the White Mountains and is here reported new for California.

Specimen examined. – **U.S.A. CALIFORNIA.** INYO CO: White Mountains, Inyo National Forest, below Grandview, E of White Mountain Rd., 37°21′18″N 118°10′51″W, 2779 m, 14.viii.2014, on *Aspicilia* sp. on metamorphosed shale, *K. Knudsen 16935* (UCR).

3. *Lichenostigma dimelaenae* Calat. & Hafellner

NOTES. – This lichenicolous fungus forms small groups of minute stromata mainly on the edges of the areoles of *Dimelaena oreina* (Ach.) Norman and appears to be host specific. For a description of *L. dimelaenae* see Calatayud et al. (2004). *Lichenostigma dimelaenae* was described from a single collection made by J. Hafellner from Grand Canyon National Park in Arizona. It was recently reported from Turkey in Asia (Yazici & Etayo 2014) and is here reported new for California.

Specimens examined. – **U.S.A. CALIFORNIA.** RIVERSIDE CO.: Joshua Tree National Park, N slope of Malapai Hill, 33°56′25.9″N 116°5′14.5″W, 1247 m, 16.xi.2012, on *Dimelaena oreina* on basalt, *J. Kocourková 8234 & K. Knudsen* (hb. Kocourková & Knudsen). SAN BERNARDINO CO.: San Bernardino Mountains, Burns Canyon, 34°15′20.4″N 116°43′18.2″W, 2093 m, 5.xi.2014, on *Dimelaena oreina* on granite, *J. Kocourková et al. 8548* (hb. Kocourková & Knudsen).

4. *Rinodina guzzinii* Jatta

NOTES. – The saxicolous lichen *Rinodina guzzinii* grows on limestone and gypsum in Asia, Africa, southern Europe and North America (Sheard 2010). In North America it has been reported from Arizona, Colorado, Montana, North and South Dakota, and Washington (Sheard 2010). The specimens cited here were identified by J.W. Sheard. For illustrations of the ascospores see Sheard (2010). It is reported new for California and was found growing on dolomite in a Bristlecone Pine forest (*Pinus longaeva*) in the White Mountains in Inyo National Forest.

Specimen examined. – **U.S.A. CALIFORNIA.** INYO CO: White Mountains, Inyo National Forest, 37°15′20.4″N 118°43′18.2″W, 3072 m, 13.viii.2014, on dolomite. *K. Knudsen 16938.1* (SASK, UCR).

5. *Stigmidium gyrophorarum* Nyl.

NOTES. – *Stigmidium gyrophorarum* is a parasite on *Umbilicaria* species in Asia, Europe, and North America (Hafellner et al. 2002, Halici et al. 2007, Kondratyuk & Kudratov 2002, Triebel & Cáceres 2004). For a description the reader should refer to Triebel & Cáceres (2004). It is here reported new for California and was collected on *Umbilicaria phaea* Tuck., the most common *Umbilicaria* species in California.

Specimen examined. – **U.S.A. CALIFORNIA.** SAN BERNARDINO CO.: San Bernardino Mountains, 34°15′20.4″N 116°43′18.2″W, 2093 m, 5.xi.2014, on *Umbilicaria phaea*, *J. Kocourková et al. 8555* (hb. Kocourková & Knudsen).

6. *Tetramelas pulverulentus* (Anzi) A. Nordin & Tibell

NOTES. – *Tetramelas pulverulentus* is a parasite on usually saxicolous *Physcia* and *Physconia* species (Foucard et al. 2002). It occurs in Antarctica, Asia, Europe and North and South America (von Brackel 2014). *Buellia pulverulenta* (Anzi) Jatta is the name that is most frequently used in the literature and the species was only recently transferred to *Tetramelas* Norman (Nordin & Tibell 2005). The ascospores are predominantly 3-septate. For a description the reader should refer to Foucard et al. (2002). It is here reported new for California where it was found on *Physcia biziana* (A. Massal.) Zahlbr.

Specimen examined. – **U.S.A. CALIFORNIA.** SAN BERNARDINO CO.: San Bernardino Mountains, Holcomb Valley, 34°18′11.1″N 116°52′45.7″W, 2120 m, 18.xi.2014, on *Physcia biziana* on granite, *K. Knudsen 17110 & J. Kocourková* (UCR).

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Lichen Diversity in Southeast Iowa

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ABSTRACT. – Exploration of the lichen diversity in southeast Iowa has historically been limited. Prior to this study only 124 of the total 7,644 known specimens of Iowa lichens (1.6%) were from four counties in southeast Iowa. After two years of field work a total of 150 species were identified from 395 specimens, 18 of which are new records for the state. Only 29 of the species found had been previously documented in southeastern Iowa. Integration of these collecting efforts with previous efforts provides an estimate of 465 species of lichens reported for Iowa. Of these species, 33 macrolichen species are likely to be rare in, or extirpated from, the state.

KEYWORDS. – Biodiversity, Great Plains, North America, land use change, United States.

INTRODUCTION

Iowa has undergone severe landscape alterations since European settlement in the early 1800's. In the 1830's, Iowa was covered in 28 million acres of tallgrass prairie mixed with wetlands and 7 million acres of forest (Johnson 2000). Between 1832 and 1875 forests of the state fell to fewer than 2.6 million acres (Cohen 1992). Virtually all of the current forested land in Iowa is second or third growth with very little or no old growth forest remaining in the state (Johnson 2000). Plowing of more than 99.9% of the 28 million acres of tallgrass prairie in the state began in the 1850's, along with conversion of 95% of prairie wetlands to agricultural use by 1970 (Cohen and Iowa Association of Naturalists 1992). Knowledge of the lichen diversity of Iowa before these land use alterations is minimal. The earliest recorded lichen collection from Iowa appears to be a specimen of *Parmotrema crinitum* (Ach.) M. Choisy collected in December 1870 by C.E. Berry in Ames, Iowa (CNALH 2014). The earliest published report of lichen diversity in the state (Bessey 1884) noted 24 lichen species. The most recent effort (Colbert 2011) estimated 448 lichen species reported for Iowa. Colbert (2011) considered species that had not been collected in the state since 1960 to be "candidates for rare or extirpated lichen species". Only macrolichens were considered for that list, with a total of 42 species listed. Species that are rare or extirpated now could have been more common before these major land use changes occurred. To search for these rare species, as well as for species not previously recorded in Iowa, a particularly underexplored portion of the state was selected to be surveyed. The southeast corner of Iowa (Louisa, Lee, Des Moines, and Muscatine counties) has been poorly represented in previous collections, with only 124 accessions representing 48 species available before this study (Figure 1). Given the lack of knowledge about the lichen diversity in this region as well as its position in the Mississippi River corridor—potentially providing a migration route for lichen species typically having a more southern distribution—southeast Iowa was the primary area of interest for this study.

MATERIALS AND METHODS

Five sites were chosen for their accessibility and geographic features in an attempt to maximize the number of lichen species collected. These sites included Shimek State Forest (Lee County locations

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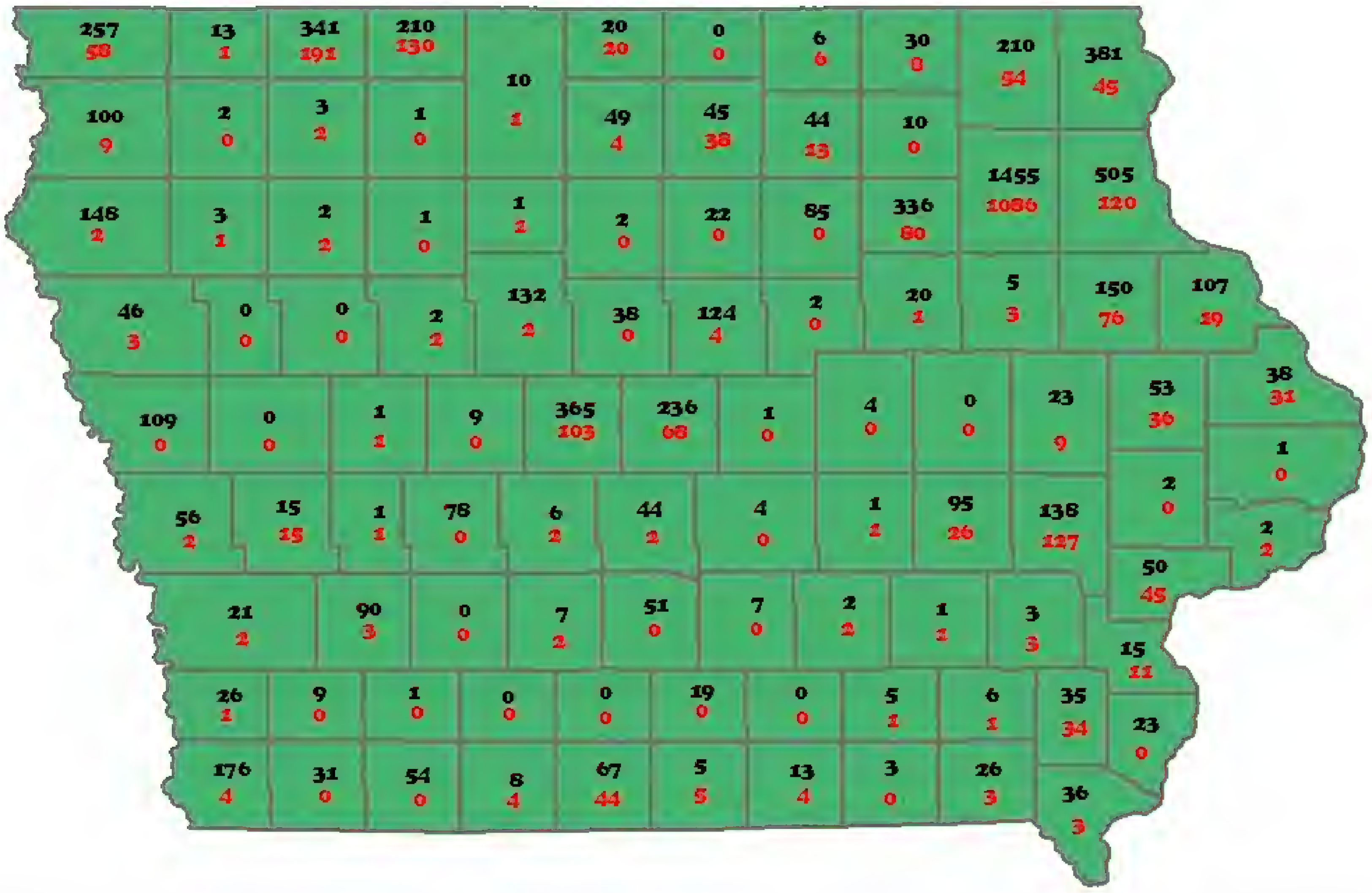

Figure 1, map of Iowa with collection effort before the present study labeled in each county. Numbers in black indicate the total number of vouchers from that county, while those in red indicate the number of vouchers collected before 1960.

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only), Big Sand Mound Preserve (Muscatine and Louisa counties), Sand Ridge (Mr. Sands' Private Property in Louisa County), Starr's Cave State Preserve (Des Moines County), and Wildcat Den State Park (Muscatine County). Specimens were collected in winter and early spring months to avoid cover by vegetation. Habitats known to contain specific distinct lichen communities (i.e. calcareous lichen species found on limestone outcropping) were purposefully sought out and searched. The time spent in each location, as well as distance traveled while searching, was documented on each trip (Table 1). Georeference data and habitat information were taken for each specimen collected. The collections were taken back to the lab where they were dried, frozen, identified (using the following references: Harris & Ladd 2005; Thomson 2003; Śliwa 2007; Smith et al. 2009; Sheard 2010; Brodo 2011; Lendemer 2013) and deposited in the Ada Hayden Herbarium (ISC) at Iowa State University. Thin layer chromatography (TLC) was performed when necessary following Orange et al. (2001). Difficult specimens were sent to J.C. Lendemer at the New York Botanical Garden for identification. A species list was created for each location to ensure that species that had already been collected at each site were not collected at the same site again. Species lists were created and compared throughout the study in an attempt to find all available species at each site.

The Iowa Lichen Checklist (http://www.public.iastate.edu/~herbarium/IowaLichen/index.html) was developed using Colbert (2011), Consortium of North American Lichen (CNALH, 2014), the ISC lichen collection, and personal visits to Coe College, the University of Nebraska-Lincoln, and the University of Minnesota. Nomenclature was updated to follow Esslinger (2014). The checklist was compared to the species found in southeast Iowa. Any species that were not reported in the Iowa lichen species checklist, but were collected in the study were termed "new state record species". The current "likely extirpated list" contains only macrolichens last collected before 1960. Only the the identifications of specimens of the species listed on the likely extirpated list were verified through a personal visit to the herbarium or receiving them on loan from the following herbaria: ASU, BRY, CINC, DUKE, FH, MICH, MIN, MSC, MONT, MU, NEB, NY, OMA, and WIS. All specimens of likely extirpated species at ISC were also verified.

Site	Size (Acres)	Miles Traveled	Hours Spent	Total Species	New Record Species
Shimek State Forest	6,794	23.5	28.5	100	10
Big Sand Mound Preserve	510	6.4	8	38	1
Sand Ridge	30	2.5	5	45	0
Wildcat Den State Park	413	7	10	49	5
Starr's Cave State Preserve	184	8.5	15	62	4
TOTAL	**7,979**	**47.9**	**66.5**	**150**	**18**

Table 1, sizes of collection sites and collecting effort compared to the total diversity recorded and number of new records for each site.

RESULTS

Over the course of two years a total of 395 specimens were collected from the five sites in southeast Iowa. These collections comprise 150 lichen species (70% macrolichens), 119 of which had not been previously reported for southeast Iowa. Of these 150 species, 18 are new records for Iowa (see Appendix I). Many of the species found in southeast Iowa (e.g., *Physcia stellaris* (L.) Nyl., *Punctelia rudecta* (Ach.) Krog, etc.) are also common throughout other regions of the state. Some species that are common in parts of Iowa (e.g., *Teloschistes chrysophthalmus* (L.) Th. Fr. in southwest Iowa) are not common in southeast Iowa. Other species (e.g., *Parmotrema perlatum* (Huds.) M. Choisy) are relatively common in Shimek Forest but were not common at the other southeast Iowa collection sites. The following species are likely state historic (i.e., not observed in 30 years) as they have not been found in locations other than southeast Iowa since 1960: *Bacidia schweinitzii* (Fr. *ex* Tuck.) A. Schneid. (last collected in 1894 in northeast Iowa), *Endocarpon diffractellum* (Nyl.) Gueidan & Cl. Roux (last collected in 1905 in northeast Iowa), *Eopyrenula intermedia* Coppins (last collected in 1895 in northeast Iowa), *Stictis urceolata* (Ach.) Gilenstam (last collected in 1895 in northeast Iowa), *Cladonia scabriuscula* (Delise) Leight. (last collected prior to the present study in 1894 in northeast Iowa), and *Usnea hirta* (L.) F.H. Wigg. (collected once in 1895 in northeast Iowa). One species that we collected in southeast Iowa had been listed by Colbert (2011) as likely extirpated (*C. scabriuscula*).

The accessions resulting from this study, as well as previous accessions present in ISC, and records from 29 additional herbaria have been compiled in the Iowa Lichen Database (Colbert 2011; http://www.public.iastate.edu/~herbarium/IowaLichen/index.html), which currently includes approximately 8,000 accessions of lichens collected in Iowa (not all collections have been verified). This total is likely to be an underestimate as some of the herbarium databases available on the Consortium of North American Lichen Herbaria website (http://lichenportal.org/portal/) do not include records for all of their holdings, and it is also likely that additional herbaria that have lichens collected from Iowa are not part of the Consortium site. Still, the current Iowa Lichen Database provides our best understanding to date of both the historic and current lichen diversity of Iowa. Our current best estimate is that a total of 465 lichen species have been reported to occur in Iowa. Some of these species are very common in the state, such as *Physcia stellaris* with 262 accessions and collection dates ranging from 1882 to 2014, and *Punctelia rudecta* with 191 accessions and collection dates ranging from 1895 to 2014. Numerous other species (78) have only been documented on one occasion in Iowa (e.g., *Ionaspis alba* Lutzoni). Ten of the 78 have not been collected since 1960, raising the question of whether they are rare in the state or simply difficult to find or identify. Such records also raise the issue of whether the specimen was correctly identified and, perhaps, whether the species is incorrectly included in Iowa's lichen diversity. The current Iowa Lichen Database includes a total of 94 species that have not been reported since 1960, 33 of which are macrolichens we consider to be likely rare or extirpated (see Appendix II). Four of these species have been reported to be acidophytic or sensitive to air pollution.

DISCUSSION

This study added 18 species to the list of lichens reported for Iowa. Two of these species have a primarily southern distribution (*Phlyctis boliviensis* Nyl. and *Lecanora appalachensis*). Many of these new state record species were found in Shimek State Forest (Table 1), which is not surprising as it is one of the largest contiguous forests in Iowa (IDNR 2014). Recently included records from other herbaria provide an additional 17 species compared with the most recent estimate (Colbert 2011). Sixteen species were incorrectly identified and removed from the list (e.g., *Lecidea melaphanoides* Nyl., *Heppia despreauxii* (Mont.) Tuck., and *Graphis eulectra* Tuck.). The work reported here increases the estimate of Iowa lichen diversity from 448 species (Colbert 2011) to 465 species. This total is similar to four states that border Iowa: Nebraska (411 species; Egan et al. 2002), Wisconsin (726 species; Bennett 2006), southeast Missouri (181, Peck et al. 2004), and Minnesota (780 species, Bennett & Wetmore, 2004), suggesting that 465 species is a reasonable approximation of the diversity of lichens in Iowa, though further collection and cryptic species (e.g., Crespo et al. 2009) could change that estimate. Many of these species (78) have only been reported once for Iowa. This number may not accurately represent their abundance in the state as some these species are small and easily overlooked. In addition, nine of the 99 counties in Iowa have yet to have a single lichen species reported (Figure 1). Further investigation of those areas could reveal additional populations, additional species, or evidence regarding the status of potentially extirpated species.

Colbert (2011) listed 42 macrolichen species and noted 60 microlichen species as being potentially rare or extirpated based on the criterion of no reports in Iowa since prior to 1960. This macrolichen list has been shortened to 33 after careful reidentification of herbarium specimens. One of the species collected in the present study (*Cladonia scabriuscula*) had been previously listed (Colbert 2011) as being potentially rare or extirpated. Given that a single collection of *C. scabriuscula* was made in the current study, characterizing this species as "rare", though not extirpated, in Iowa seems appropriate. None of the other 150 species collected in southeast Iowa were on the previous list of potentially rare or extirpated species, supporting the conclusion that the 33 species listed here are indeed likely to be rare or extirpated. Colbert (2011) searched extensively for *Lobaria pulmonaria*, but was unable to find it in the northeast portion of the state where it had been previously reported. This large and easily detected macrolichen was also not found in southeast Iowa. There is insufficient evidence available to make the claim that the 60 microlichen species not collected since 1960 are likely to be rare or extirpated as was noted by Colbert (2011).

The 33 macrolichen species that are likely to be rare or extirpated correspond to approximately 7% of the estimated total lichen diversity and approximately 14% of the macrolichen diversity in Iowa. There are numerous potential explanations for rarity, including the possibility that these species were rare in Iowa prior to European settlement. The large number (22) of these macrolichen species last reported from Iowa prior to 1900, however, argues that at least some of these species have been extirpated from the state subsequent to European settlement. Dramatic changes in land use could certainly have led to extirpations, but other more subtle impacts could also play a role in some cases.

Some lichen species are known to be sensitive to airborne pollutants (Richardson 1992). Some of these pollutants are deposited near farm and agricultural fields as dust or gases. Dust pollution can cause high concentrations of aluminum, iron, scandium, tin, and other elements (Nash 2008), and today large hog farms are regulated to reduce levels of both air and water pollution caused by hydrogen sulfide and ammonia emissions (Sneeringer 2010). Increases in atmospheric nitrogen deposition are a known global threat to the composition and function of ecosystems (Bobbink et al. 1998, 2010; Sala et al. 2000). The effects of anthropogenic nutrient inputs, especially nitrogen, on native plant vegetation has been the topic of many studies (Gratton & Denno 2003, Gross et al. 2005, Tilman & Lehman 2001). Results of these studies have shown both increases and decreases (depending on the species) in productivity, biodiversity, flowering, and tolerance to abiotic stresses (Bobbink et al. 2010, Galloway et al. 2004, Phoenix et al. 2011). Increased nutrient level effects on lichen communities include: changes in lichen species composition and cover, and changes in species distribution and colonization patterns, where species intolerant of eutrophic habitats are lost (Ruoss 1999).

There are 39 lichens on Iowa's Lichen Checklist that are considered sensitive, acidophytic, or oligotrophic species in other studies (Lawrey 1993; Richardson 1992; USFS 2013; Wetmore 1983, 1987, 1989, 1992, 1993a, 1993b, 1995). Some lichen species also have conflicting sensitivity ratings in different geographic areas (Lawrey 2014, USFS 2013). Species such as *Parmotrema crinitum* and *Usnea hirta* are known to be both sensitive as well as oligotrophic species (USFS 2013, Wetmore 1993a) and were unexpectedly found still persisting in the state. Perhaps climatic conditions in Iowa, most importantly the fluctuations in temperature and moisture levels, aid in lichen tolerance of nitrogen deposition. High rains occurring while nitrogen deposition is at its peak can lessen the negative effects of atmospheric pollutants (Tretiach et al. 2012). Forest density and distance from agricultural land may also play a role in filtering out detrimental atmospheric levels of nitrogen and other pollutants.

Even if all 33 of the potentially extirpated macrolichens are actually extirpated from the state, Iowa still has a remarkable extant lichen diversity of at least 400 species. This biological resource should be further explored giving attention to the diversity, distribution, and abundance of these organisms throughout the state. The 33 likely extirpated macrolichen species (see Appendix II) should be considered for listing as "special concern species" by the State of Iowa so that appropriate conservation measures could be taken for any populations that may be discovered in the future. Missouri, for example, has lichen species on their Communities of Conservation Concern Checklist rated as "vulnerable" (MDC 2015). Consideration should also be given to reintroduction of extirpated lichen species in Iowa for which suitable habitat can be identified.

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APPENDIX I – LICHEN SPECIES COLLECTED IN SOUTHEAST IOWA

Lichen species collected in southeast Iowa. New state record species are highlighted in gray. The "#" column represents the total number of known accessions for each species (including collections outside of southeast Iowa). Rare/uncommon species are indicated with "*" in the "#" column. Sensitivity abbreviations are the following: "S" means sensitive to sulfur and other air pollutants, "I" indicates species with intermediate sulfur and other air pollutant sensitivity, "T" indicates sulfur and other air pollutant tolerance, "S-I" indicates species between sensitive and intermediate, "N" indicates nitrophytic species, "A" indicates acidophytic species, "E" indicates eutrophic species, "O" indicates oligotrophic species, "M" indicates mesotrophic species. All sensitivity ratings that were contradictory are not listed. Sources for these ratings are provided in the Discussion section. States adjacent to Iowa that have collections of "new record" or "rare" species are listed.

Genus	Species	Synonyms	#	Sens-itivity	Adjacent States
Acrocordia	**cavata**	*Arthopyrenia cavata*	8		
Acrocordia	**conoidea**	*Arthopyrenia conoidea*	2		
Alyxoria	**varia**	*Opegrapha diaphora, O. varia*	87		
Amandinea	**dakotensis**	*Rinodina dakotensis, R. finkii, R. inaequalis, R. pennsylvanica, R. subplumbea, R. subpyriniformis*	30		
Amandinea	**punctata**	*Buellia punctata, B. myriocarpa, B. pullata*	65	N	
Anisomeridium	**biforme**	*Arthopyrenia biformis, A. parvula, A. conformis auct. N. Am., Ditremis biformis, Trimmatothele umbellulariae*	4		
Anisomeridium	**polypori**	*Anisomeridium nyssaegenum, Ditremis nyssigena, Arthopyrenia willeyana*	12		
Arthonia	**atra**		2	I	
Arthonia	**patellulata**		9		
Arthonia	**radiata**		49	I, A	

Arthothelium	***spectabile***	*Arthonia spectabilis*	34		
Athallia	***holocarpa s.l.***	*Caloplaca holocarpa s.l.*	44	N	
Bacidia	***granosa***	*Bilimbia pammellii, B. trachona auct.*	47		
Bacidia	***rubella***		12	I	
Bacidia	***schweinitzii***	*Biatora leucampyx*	3*		
Bacidia	***suffusa***	*Biatora suffusa*	26		
Bacidina	***egenula***	*Bacidia egenula*	10		
Bacidina	***inundata***	*Bacidia inundata*	41		
Bagliettoa	***calciseda***	*Verrucaria calciseda*	3		
Biatora	***vernalis***	*Lecidea vernalis*	1		IL, MI,MN, WI
Bilimbia	***sabuletorum***	*Bacidia sabuletorum, B. hypnophila, Mycobilimbia sabuletorum, Myxobilimbia sabuletorum*	40		
Caloplaca	***cerina***		144	S-I	

Caloplaca	***microphyllina***		73		
Caloplaca	***soralifera***		6		
Caloplaca	***ulcerosa***		11		
Candelaria	***concolor***		200	E, N	
Candelaria	***fibrosa***		66		
Candelariella	***aurella***		7	N	
Candelariella	***efflorescens***		9		
Catillaria	***chalybeia***		2		
Catillaria	***glauconigrans***		1		WI, SD
Catillaria	***nigroclavata***	*Bacidia declinis, Bilimbia declinis, Lecidea declinis*	4		
Chrysothrix	***caesia***	*Allarthonia caesia, Arthonia lecideella, Arthonia caesia*	93		
Cladonia	***apodocarpa***		9		
Cladonia	***caespiticia***		5		
Cladonia	***cariosa***		25		
Cladonia	***chlorophaea***		43	S, I, E	
Cladonia	***coniocraea***		26	I, S	
Cladonia	***crispata***		2		WI, IL,SD, MN

Cladonia	***cristatella***		32	I	
Cladonia	***cryptochlorophaea***		6		
Cladonia	***decorticata***		7		
Cladonia	***fimbriata***		14	S-I, S, E	
Cladonia	***furcata***		73	I, O, T	
Cladonia	***macilenta***		23	S, E	
Cladonia	***parasitica***		35		
Cladonia	***peziziformis***	*C. mitrula, C. capitata*	55		
Cladonia	***pyxidata***		44	M	
Cladonia	***rei***		17		
Cladonia	***robbinsii***		10		
Cladonia	***scabriuscula***		2*		MI, MN, SD, WI,
Cladonia	***squamosa***		21	I, E	
Cladonia	***strepsilis***		1		MO, WI
Cladonia	***subcariosa***	*C. clavulifera, C. polycarpoides*	8		WI, IL, NE, MO
Cladonia	***subtenuis***	*Cladina rangiferina*	12		
Cladonia	***subulata***		2		MN, IL
Cladonia	*symphycarpia*		18		
Coenogonium	***pineti***	*Dimerella pineti, D. diluta, Microphiale diluta*	1		WI, SD, MO, MN, IL

Collema	***subflaccidum***		12		
Collema	***texanum***	*Synechoblastus texanus, S. laciniatus*	1		
Cyphelium	***tigillare***		26		
Dermatocarpon	***luridum***		5		
Dermatocarpon	***miniatum***		107		
Diploschistes	***muscorum***		12		
Endocarpon	***diffractellum***	*Staurothele diffractella, Verrucaria diffractella*	7*		
Endocarpon	***pallidulum***		78		
Flavoparmelia	***baltimorensis***	*Parmelia baltimorensis, Pseudoparmelia baltimorensis*	5		
Flavoparmelia	***caperata***	*Parmelia caperata, P. cylisphora, P. flavicans, P. herreana, P. negativa, Pseudoparmelia caperata*	123	I, E, N	
Flavoplaca	***citrina***	*Caloplaca citrina*	29	N	
Graphis	***scripta***		159	I	
Gyalolechia	***flavorubescens***	*Caloplaca flavorubescens*	107		

Gyalolechia	***flavovirescens***	*Caloplaca flavovirescens*	71		
Hyperphyscia	***adglutinata***	*Physcia adglutinata, P. elaeina, Physciopsis adglutinata, P. elaeina*	53	I, A	
Hyperphyscia	***syncolla***	*Physcia syncolla, Physciopsis syncolla*	133		
Lecania	***cyrtella***		1	A	SD, MN
Lecania	***croatica***		1		MI, MO, WI, IL
Lecania	***erysibe***		6		
Lecanora	***appalachensis***		1		
Lecanora	***chlarotera***	*L. rugosella*	9	I	
Lecanora	***dispersa***		40	T, N	
Lecanora	***strobilina***		17		
Lecanora	***symmicta***	*Lecidea symmicta*	21		
Lecanora	***thysanophora***		14		
Lepraria	***finkii***	*Crocynia aliciae, C. americana, L. lobificans*	69	A	
Myelochroa	***aurulenta***	*Parmelina aurulenta, Parmelia aurulenta, P. silvestris*	77		
Myelochroa	***galbina***	*Parmelina galbina, Parmelia galbina, P. subquercifolia, P. sulphurosa*	31		
Opegrapha	***herbarum***		4		
Opegrapha	***vulgata***		2	I	
Parmotrema	***austrosinense***	*Parmelia austrosinensis*	1		WI, MO, IL

Parmotrema	***crinitum***	*Parmelia crinita, Parmelia proboscidea*	20	S,O	
Parmotrema	***hypotropum***	*Parmelia hypotropa, Parmelia hypotropa var. sorediata , P. cetrata var. hypotropoides*	10	T	
Parmotrema	***perlatum***	*Parmelia perlata, P. trichotera, Parmotrema chinense*	5	A	
Parmotrema	***reticulatum***	*Parmelia reticulata, Rimelia reticulata*	17	S	
Peltigera	***canina***		82	T	
Peltigera	***praetextata***		33	S	
Pertusaria	***macounii***		1		WI, MN, MO
Pertusaria	***pustulata***		41		
Pertusaria	***rubefacta***		1		
Phaeophyscia	***adiastola***	*Physcia adiastola*	57		
Phaeophyscia	***ciliata***	*Physcia ciliata, P. obscura auct.*	139		
Phaeophyscia	***hirsuta***	*Phaeophyscia cernohorskyi, Physcia hirsuta*	57		
Phaeophyscia	***hirtella***		20		
Phaeophyscia	***hispidula***	*Physcia hispidula, P. setosa*	19		
Phaeophyscia	***orbicularis***	*Physcia orbicularis, P. virella*	40	I, E, N	
Phaeophyscia	***pusilloides***	*Physcia pusilloides*	29		

Phaeophyscia	***rubropulchra***	*Physcia orbicularis f. rubropulchra, P. endochrysea, P. rubropulchra*	64	N	
Phaeophyscia	***sciastra***	*Physcia sciastra, P. lithotea*	17	S, N	
Phlyctis	***boliviensis***		3		MO
Physcia	***adscendens***		7	I, T, E, N	
Physcia	***aipolia***		128	I, T, E, N	
Physcia	***americana***		48	E	
Physcia	***millegrana***		109	I, N, T	
Physcia	***phaea***	*Parmelia phaea*	7		
Physcia	***stellaris***		260	I, S, M	
Physcia	***subtilis***		16		
Physciella	***chloantha***	*Physcia chloantha, P. luganensis, Phaeophyscia chloantha*	76		
Physciella	***melanchra***	*Physcia melanchra, Phaeophyscia melanchra*	23		
Physconia	***detersa***	*Physcia detersa*	59	I, T	
Physconia	***enteroxantha***		3	E, S	
Physconia	***leucoleiptes***	*Physconia kurokawae*	65		
Porpidia	***albocaerulescens***	*Huilia albocaerulescens, Lecidea albocaerulescens, L. hebescens*	9		

Protoblastenia	***rupestris***		9		
Psoroglaena	***cf. dictyospora***	*Macentina dictyospora*	1		SD, MN, IL, NE, MO
Punctelia	***bolliana***	*Parmelia bolliana, P. frondifera*	157		
Punctelia	***rudecta***	*Parmelia rudecta*	191	N,	
Pyrenula	***pseudobufonia***		25		
Pyxine	***sorediata***		19		
Ramalina	***americana***	*Ramalina fastigiata*	52	S	IL, MI, MN, MO, NE, WI
Rinodina	***efflorescens***		2		WI, MN
Rinodina	***freyi***	*Rinodina glauca*	2		
Rinodina	***populicola***		18		
Rinodina	***pyrina***		2		
Scoliciosporum	***chlorococcum***	*Bacidia chlorococca*	10	I, N	
Scytinium	***lichenoides***	*Leptogium lichenoides*	41	O	
Squamulea	***subsoluta***	*Caloplaca subsoluta*	61		
Stictis	***urceolatum***	*Conotrema urceolatum*	5*		

Teloschistes	***chrysophthalmus***		105		
Thelidium	***minutulum***		1		MO
Trapelia	***placodioides***		1		WI, MO, MN, IL
Trapeliopsis	***viridescens***		3		WI
Usnea	***hirta***		2*	S-I, O, I	MO, MN, SD, NE, WI
Verrucaria	***calkinsiana***		4		WI, MN, IL, SD, NE, MO
Verrucaria	***furfuracea***		2		
Verrucaria	***muralis***		30		
Verrucaria	***nigrescens***		25		
Xanthocarpia	***feracissima***	*Caloplaca feracissima*	44		
Xanthomendoza	***fallax***	*Xanthoria fallax*	105	S-I, E, S	
Xanthomendoza	***fulva***	*Xanthoria fulva*	51	E	
Xanthomendoza	***ulophyllodes***	*Xanthoria ulophyllodes*	52		

APPENDIX II – Macrolichen species not reported since 1960

Macrolichen species that have not been reported since 1960 (data from Iowa Lichen Database - http://www.public.iastate.edu/~herbarium/IowaLichen/index.html) and are likely to be rare in, or extirpated from Iowa. The "#" column represents the total number of accessions of each species. All herbaria that have collections of each species are listed as well as sensitivity ratings if available: "S" indicates sensitive to sulfur and other air pollutants, "I" indicates species with intermediate sulfur and other air pollutant sensitivity, "T" indicates sulfur and other air pollutant tolerance, "A" indicates acidophytic species, and "O" indicates oligotrophic species. Sensitivity ratings that were contradictory are not included.

Genus	Species	#	Most Recent Collection Date	Herbaria	Sens-itivity	Verified Voucher
Bryoria	***furcellata***	2	1895	WIS, MIN		MIN 23172 WIS 0040217
Cladonia	***arbuscula* subsp. *mitis***	1	1894	WIS		WIS 11930
Cladonia	***coccifera***	2	1895	ISC, NEB		ISC 25703
Cladonia	***conista***	1	1927	NY		NY 01047042
Cladonia	***cylindrica***	2	1957	MSC		MSC 52504
Cladonia	***gracilis***	5	1912	NEB, MIN, ISC, WIS	T	ISC 25087
Cladonia	***macilenta* var. *bacillaris***	1	1902	WIS		WIS 37141
Cladonia	***stellaris***	1	1894	MIN		MIN 19175
Cladonia	***uncialis***	5	1957	MSC, NEB, MIN, WIS		NEB28575
Collema	***pulcellum***	3	1895	OS, NEB, ISC		ISC 344553
Collema	***pustulatum***	2	1896	MICH		MICH 102566, 102565
Enchylium	***conglomeratum***	16	1897	ISC, MONT, MSC, OMA, OS, NEB, MIN, DUKE		NEB 28840 28837
Enchylium	***polycarpon***	2	1957	MSC, OS		MSC 55581
Evernia	***mesomorpha***	4	1895	WIS, MIN, NEB	I	MIN 23258; WIS 46356; NEB 29390
Heterodermia	***echinata***	4	1895	ISC, MIN, NEB		ISC 869929; NEB 29801
Leptogium	***burnetiae***	3	1895	ISC, MIN		ISC 25913
Leptogium	***corticola***	20	1903	ISC, MSC, US, NEB, MIN, WIS		ISC 321635
Leptogium	***saturninum***	1	1893	MIN		MIN 679715

Lobaria	***pulmonaria***	7	1901	ISC, US, WIS, NEB, MIN	S,O	Verified by Colbert 2011
Parmelia	***squarrosa***	2	1913	MIN	S,O	MIN 827766
Parmotrema	***michauxianum***	1	1897	MIN		MIN 895971
Pertusaria	***leioplaca***	3	1898	MIN,WIS		MIN 21081 WIS 67065
Pertusaria	***plittiana***	1	1895	ISC		ISC 869995
Placidium	***arboreum***	8	1898	NEB, OMA, MIN, WIS		MIN 655876 WIS 72014 OMA 13263
Ramalina	***sinensis***	1	1899	MIN		MIN 655886
Scytinium	***plicatile***	5	1895	ISC, NEB, MIN		NEB 31683
Solorina	***saccata***	5	1956	ISC, NY		ISC 869935; NY 01399113 01399114 0139915 01399116
Tuckermannopsis	***americana***	12	1896*	ISC, US, MIN, WIS		ISC 344492
Tuckermannopsis	***ciliaris***	3	1896	US, NEB, MIN	A, S	MIN 735481
Usnea	***angulata***	8	1895	ISC, WIS, NEB, MIN		ISC 24902
Usnea	***longissima***	1	1894	ISC		ISC 321528
Usnea	***strigosa***	8	1895	ISC, WIS, MIN,	A	ISC 869933 MIN 652018
Xanthoparmelia	***conspersa***	1	1895	NEB		NEB 38477

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Protoparmelia ryaniana is a synonym of *Lecanora verrucariicola*, which belongs in the genus *Miriquidica* (Lecanoraceae)

KERRY KNUDSEN[1], JANA KOCOURKOVÁ[2] & TIM WHEELER[3]

ABSTRACT. – *Lecanora verrucariicola* was described in 2004 by Bruce Ryan based on a holotype collected on Catalina Island in southern California. In 2008, the taxon was described again as *Protoparmelia ryaniana* from a collection from Baja California in Mexico, with the holotype of *L. verrucariicola* cited as a paratype. We show that *Protoparmelia ryaniana* is a superfluous and illegitimate synonym of *L. verrucariicola*. The nomenclature error is corrected, *Protoparmelia ryaniana* is made a synonym of *Lecanora verrucariicola*, and *Lecanora verrucariicola* is transferred to *Miriquidica*.

KEYWORDS. – Baja California, Channel Islands, *Miriquidica mexicana,* Pacific Plate Lichen Bioregion, nomenclature.

INTRODUCTION

The authors are currently researching a book on the lichenized fungi of the eight islands of southern California that comprise the Channel Islands. An important part of this study is a review of rare fungal species that warrant monitoring in the future by the various relevant government agencies and NGOs responsible for the management of the islands. One rare species is *Lecanora verrucariicola* B.D. Ryan which was described from a holotype collected on Catalina Island and from several paratypes from Catalina Island and Santa Rosa Island, as well as from Baja California in Mexico (Ryan et al. 2004). The first author never found any type material during visits to ASU where they were published as being deposited. Later, because we found no specimens which had been identified as *L. verrucariicola* since the original publication of the name, and we had not collected any specimens that we could positively identify as *L. verrucariicola*, we assumed it was rare and potentially even had been extirpated in this short timeframe. When we began the review of the rare species of *Lecanora* from the islands, we found that the holotype and paratypes of *L. verrucariicola* were still not digitized (CNALH 2015). Further study led us to recognize that the same material was later described a second time under the name *Protoparmelia ryaniana* van den Boom, Sipman & Elix. Here we recognize *P. ryaniana* as a superfluous renaming of *L. verrucariicola*, discuss the species, and transfer the name to *Miriquidica* based on recently published molecular data.

MATERIALS AND METHODS

This study is based on a critical analysis of the literature describing the taxon, the herbarium records available online at CNALH and UCR, and an examination of specimens from B and UCR using hand sections mounted and measured in water. Photos were taken with a Pentax K3 DSLR, mounted on a Stackshot rail, and combined in Helicon Focus.

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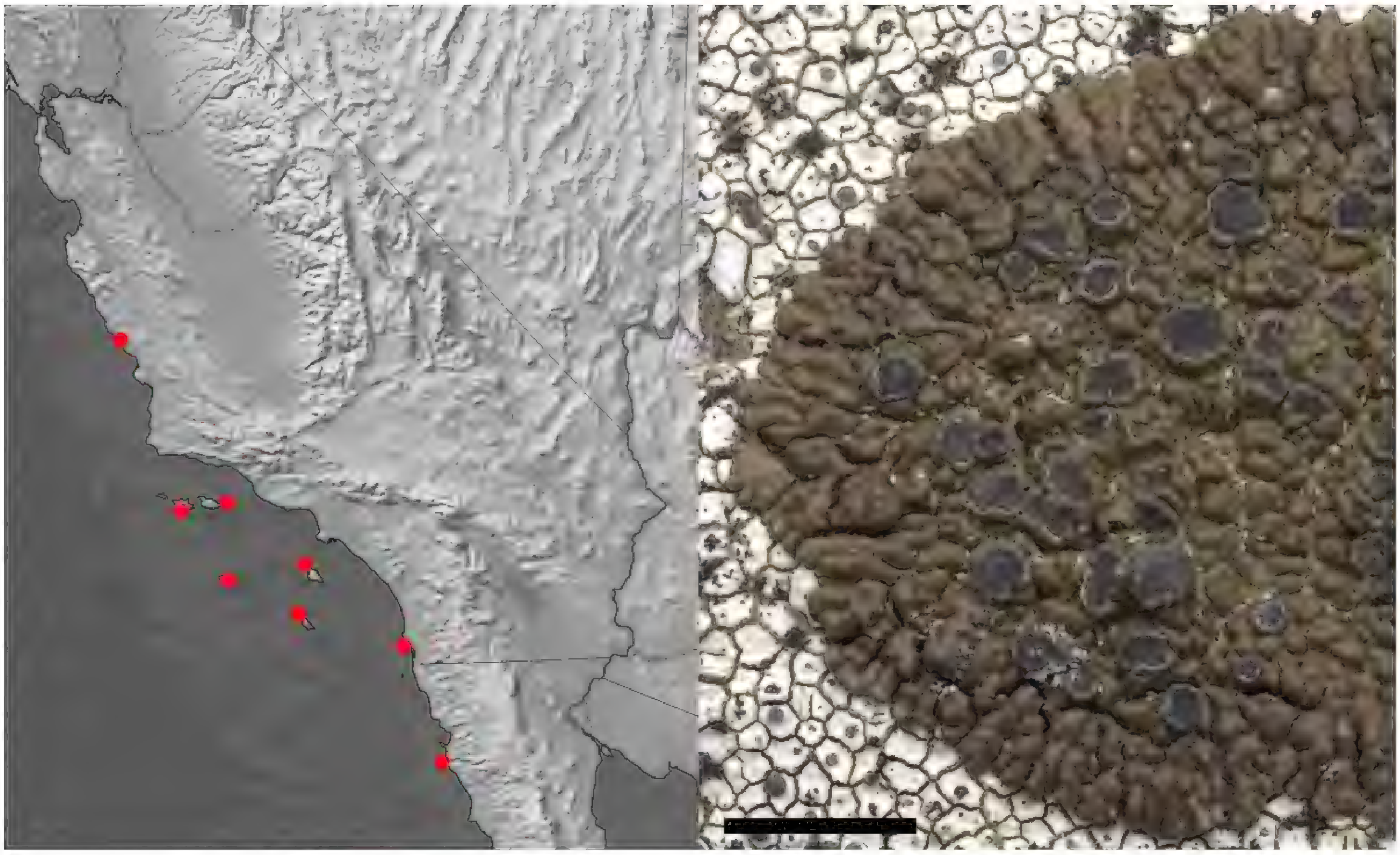

Figure 1, known geographic distribution (left) and morphology (scale = 2.0 mm, field image captured by T. Wheeler) of *Miriquidica verrucariicola*.

RESULTS

During the first author's visits to ASU between 2003 and 2008 to study Acarosporaceae as well as newly described species from the Sonoran region, he could not locate the holotype or paratypes of *Lecanora verrucariicola* as well as several other taxa such as *Adelolecia sonorae* Hertel, *Lecanora crassithallina* van den Boom and *Toninia nashii* Timdal that were stated to have been deposited at ASU. At that time it was assumed that they were missing and might have still been on loan to authors of the various treatments prepared for the *Lichen Flora of the Greater Sonoran Desert Region*. When we began our study of *Lecanora* species on the Channel Islands, no specimens of *L. verrucariicola* had yet been databased or digitized at ASU or any other herbaria (CNALH 2015). We were perplexed since the species was described by Bruce Ryan and the type collection was made by Thomas Nash, the material should have been in ASU where they both had worked.

Eventually, in rereading the last paragraph of the discussion of *Lecanora verrucariicola* (Ryan et al. 2004: 281) we noticed an apparent typographic error: the species was referred to as "*Lecanora lichenicola*" (Ryan et al. 2004). We then connected that statement with one in the discussion of *Protoparmelia ryaniana* where it was stated that some herbarium specimens may have be annotated as "*Lecania lichenicola*" or "*Lecanora lichenicola*" on page 393 (van den Boom et al. 2008: 393). Using the type collection numbers cited for *L. verrucariicola*, a search of CNALH quickly showed that while some paratypes were missing, the holotype of *L. verrucariicola* and one paratype at ASU had been annotated by P.G.G. van den Boom as *P. ryaniana*. In fact the holotype of *L. verrucariicola* had been listed as a paratype of *P. ryaniana* in the protologue of the latter name (van den Boom et al. 2008). The mystery of the missing holotype of *L. verrucariicola* was solved. It was at ASU filed under the name *P. ryaniana*. The holotype was originally determined as an unknown *Lecania* species by Thomas Nash, there is no annotation by Bruce Ryan, and it was later annotated by van den Boom as *P. ryaniana* at a later unspecified date (Walter Fertig, pers. comm.).

Based on our study of the southern California islands and the adjacent coast, *Protoparmelia ryaniana* is a good species. We have made additional collections of it, extending its range to the central California coast as well as to West Anacapa Island, Santa Cruz Island, San Nicolas Island, and San Clemente Island (Knudsen & Kocourková 2009, 2010, 2012; UCR 2015). A comparative literary analysis of the original description of *Lecanora verrucariicola* and the description of *P. ryaniana,* and an examination of the specimens of *P. ryaniana* made clear that Bruce Ryan had originally described *P. ryaniana* under the name *L. verrucariicola.* The only major difference between the two descriptions is that *L. verrucariicola* was described as containing an unknown ("CE-71; Pale yellow-gray phenolic 3-A, 5-B, 5-C") and being spot test negative while *P. ryaniana* was described as containing lobaric acid and having a KC+ violet medulla. The RFI of the unknown described from *L. verrucariicola* matches that of lobaric acid (J.A. Elix, pers. comm.). The first specimen we identified as *P. ryaniana* was spot test negative and was verified as having lobaric acid (Lendemer pers. comm.; TLC in Solvent C). Once one collection was verified, we could easily identify *P. ryaniana* through standard microscopy and through observation of its parasitic habit in the field without further ascertaining its secondary metabolites. We had been collecting *L. verrucariicola* all along and it was not rare on the Channel Islands. Through a chain of mistakes, probably initiated by the death of Bruce Ryan, van den Boom and the principal editor of the *Sonoran Lichen Flora*, Thomas Nash must not have realized that *L. verrucariicola* was redescribed as *P. ryaniana.* Since the description of *P. ryaniana* included the type of an earlier name, *P. ryaniana* is an illegitimate and superfluous renaming of *L. verrucariicola*.

The question remains as to whether *Lecanora verrucariicola* is actually a *Protoparmelia*. In the case of this taxon, a recent phylogenetic study found that *P. ryaniana* does not belong to *Protoparmelia* s. str. (Singh et al. 2015). The specimens used for the molecular analyses in that study were actually collections made by the authors of the present contribution. Singh et al. (2015) recovered the taxon as sister to species of the genus *Miriquidica.* Although further study of the relationship between the taxon and *Miriquidica* is needed, it is clear based on the available data the species does not belong to *Protoparmelia.* To correct the nomenclatural error and the confusion between *L. verrucariicola* and *P. ryaniana*, both being listed as valid species in the North America checklist (Esslinger 2015) and in the California lichen checklist (Tucker 2013), we here transfer *L. verrucariicola* to *Miriquidica* and treat *P. ryaniana* as an illegitimate synonym (McNeil et al. 2013).

Ironically, some specimens of this taxon from Baja California were originally also treated as *Miriquidica mexicana* Rambold, Sipman & Hertel in the treatment of that taxon published in the *Lichen Flora of the Greater Sonoran Desert Region* (Nash et al. 2004). Although the holotype of *M. mexicana* was previously shown to be a synonym of *M. scotopholis* (Tuck.) B.D. Ryan & Timdal (Lendemer & Knudsen 2008), those specimens with lobaric acid and lacking miriquidic acid cited by Nash et al. (2004) as *M. mexicana* were later treated as *P. ryaniana* (van den Boom et al. 2008).

THE SPECIES

Miriquidica verrucariicola (B.D. Ryan) K. Knudsen & Kocourk., comb. nov.
Mycobank #815090.

≡ ***Lecanora verrucariicola*** B.D. Ryan, Lichen Flora of the Greater Sonoran Desert Region 2: 280. 2004. **TYPE: U.S.A. CALIFORNIA**: LOS ANGELES CO.: Santa Catalina Island, Parsons Landing adjacent to an old quarry, 33°28′30″N 118°32′45″W, 20 m, on rock, 29.xii.1993, *T.H. Nash 32184* (ASU[n.v.], holotype; hb. van de Boom[n.v.], isotype). Fig. 1.

= ***Protoparmelia ryaniana*** van den Boom, Sipman & Elix *nom. illeg.*, syn. nov. **TYPE: MEXICO. BAJA CALIFORNIA**: Punta Santa Tomas, c. 30 km SW of Ensenada, 31°33′N 116°42′W, 80 m, on acidic rock, 1989, *H. Sipman 24745* (B!, holotype; hb. v.d. Boom[n.v.], isotype)

DESCRIPTION. — For excellent descriptions of this taxon the reader should refer to Ryan et al. (2004) under the name *Lecanora verrucariicola* and van den Boom et. al (2008) under the name *Protoparmelia ryaniana*.

SECONDARY METABOLITES. — Lobaric acid (major or minor), oxolobaric acid (major), norlobaric acid (minor) produced in medulla (Ryan et. al. 2004, van den Boom et al. 2008). Spot tests of the medulla are either entirely negative (Ryan et al. 2004) or KC+ violet and distinctly UV+ blue-white.

ECOLOGY AND SUBSTRATE. — In coastal habitats at low elevations on non-calcareous rock, parasitic on *Dimelaena radiata* (Tuck.) Hale & Culb., *Tephromela* species, and *Verrucaria subdivisa* Breuss, rarely other crustose species, or independent, in mixed saxicolous communities.

DISTRIBUTION. — Endemic to the Pacific Plate Lichen Bioregion: along the Pacific coast from Baja California in Mexico to San Simeon in central California and on six of the Channel Islands (Anacapa, Catalina, San Clemente, Santa Cruz, San Nicolas, and Santa Rosa). (Ryan et al, 2004; van den Boom et al. 2008; Knudsen & Kocourková 2009, 2010, 2012; CNALH 2015; UCR 2015).

Selected specimens examined. — **U.S.A. CALIFORNIA**. LOS ANGELES CO.: San Clemente Island, west end, 32°57′53.5″N 118°33′51″W, elevation unknown, on *Dimelaena radiata* and basalt, 18.iv.2014, *K. Knudsen 16528 & E. Howe* (UCR). SAN DIEGO CO.: Point Loma Ecological Preserve, navy property S of McClelland and the waste management facility, E of cemetery, 32°42′46″N 117°15′37″W, 72 m., on granite and other crustose lichens, 15.iv.2007, *K. Knudsen 8424* (UCR). SAN LUIS OBISPO CO.: San Simeon, San Simeon State Park, solitary boulder on rim of canyon, 35°35′49″N 121°6′42″W, 141 m, on *Dimelaena radiata* and shale, 11.iv.2010, *K. Knudsen 12146* (UCR). SANTA BARBARA CO.: Santa Cruz Island, cliff above Smuggler's Road, 34°2′50.5″N 119°33′33.3″W, 9 m, on basalt, 30.vii.2012, *K. Knudsen 14999 & J. Kocourková* (UCR); Santa Rosa Island, South Point, 33°54′27″N 120°7′34″W, 198 m, on sandstone, 14.vi.2009, *K. Knudsen 11439 & S. Chaney* (NY, UCR). VENTURA CO.: San Nicolas Island, slope above L Canyon, 33°14′23.7″N 119°27′04.6″W, 105 m, lichenicolous on *Dimelaena radiata* on quartzitic cobble of Pleistocene beach terrace, 24.vii.2015, *T. Wheeler 7115 & K. Knudsen* (hb Wheeler).

ACKNOWLEDGEMENTS

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A new species of *Acarospora* (Acarosporaceae) from eastern Canada with melanized epihymenial accretions, with additional notes on *A. anatolica* and *Polysporina terricola*

KERRY KNUDSEN[1] & JANA KOCOURKOVÁ[2]

ABSTRACT. – *Acarospora maccarthyi* is described as new from southwestern Newfoundland in Canada. The species is compared with *Polysporina terricola* from Tasmania which is also transferred to *Acarospora* and given the new name *A. tasmaniensis*. *Acarospora anatolica*, another similar species, is reported new from the northern Himalayas in Pakistan.

KEYWORDS. – *Dimelaena oreina,* lichenicolous fungi, lichenicolous lichens, nomenclature, taxonomy.

INTRODUCTION

Polysporina Vězda was a genus of crustose lichens assigned to the Acarosporaceae that was primarily characterized by having apothecia with melanized epihymenial accretions and lecideine margins. In a large phylogenetic study recently published, the genus was found to be polyphyletic (Westberg et al. 2015). Most of the species that had been placed in *Polysporina*, including the type of the genus *P. simplex* (Taylor) Vězda, were found to be embedded in a large well-supported clade together with many other taxa including the type of *Acarospora schleicheri* (Ach.) A. Massal. Another smaller group, including *P. cyclocarpa* (Anzi) Vězda, was in a strongly supported clade basal to *Sarcogyne*. The basal relationship of the clade to *Sarcogyne* was poorly supported and needs further phylogenetic study.

During our studies over the last four years we have analyzed three taxa from North America with melanized epihymenial accretions which could have been placed in *Polysporina*. For the sake of nomenclatural stability, we refrained from publishing studies of them until the phylogenetic analysis of *Polysporina* taxa was published (Westberg et al. 2015). In this paper we describe the first of these three taxa, *Acarospora maccarthyi*.

MATERIALS AND METHODS

Hand sections of the holotype were studied with standard microscopy in water and potassium hydroxide (K). Measurements were made in water. Amyloid reactions were tested with Lugol's iodine solution (I), with or without pretreatment with K. Mounted sections were tested with K and C for secondary metabolites. For the purposes of illustration, the specimen was wetted to bring out the contrast between the apothecia and areoles, allowed to dry for fifteen minutes, and photographed with an Olympus DP72 digital camera on an Olympus SZX 7 stereomicroscope.

THE NEW SPECIES

***Acarospora maccarthyi* K. Knudsen & Kocourk., sp. nov.**
Mycobank # 815453.

FIGURE 1A.

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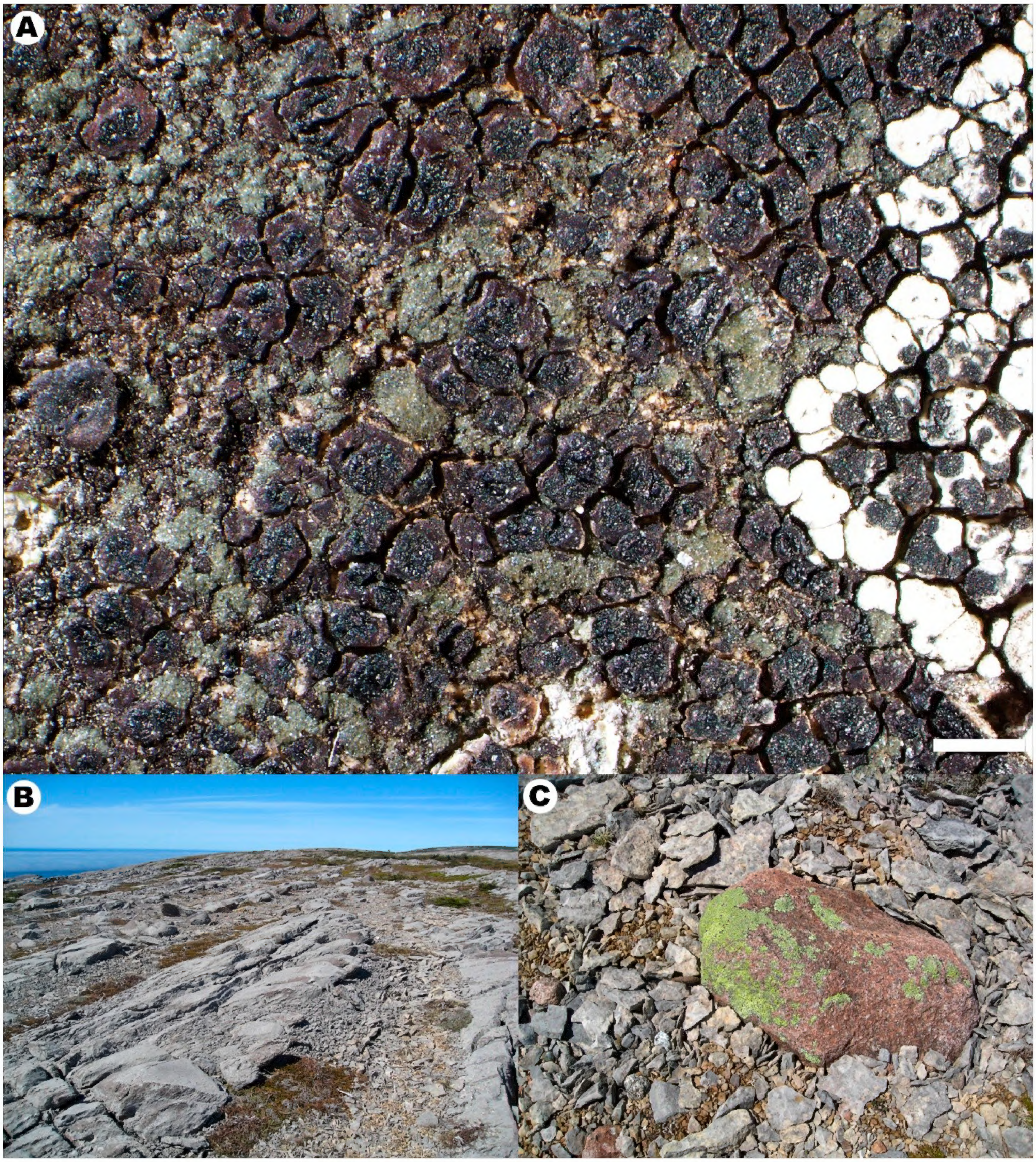

Figure 1, morphology (A, from the holotype) and habitat (B and C) of *Acarospora maccarthyi*. A, morphology of the species associated with *Dimelaena oreina* (photograph by Jana Kocourková). B, type locality, limestone barrens on the Port-au-Port Peninsula, Newfoundland (photograph by John McCarthy). C, typical silicate rock surrounded by limestone in frost boil, Port-au-Port Peninsula, Newfoundland (photograph by John McCarthy).

DIAGNOSIS. – Similar to *Acarospora tasmaniensis*, but differing especially in having a corticate thallus, lower hymenium (100 µm vs. 170–240 µm) and lacking a melanized lecideine exciple.

TYPE: **CANADA. NEWFOUNDLAND AND LABRADOR:** Newfoundland, Port-au-Port Peninsula, between Cape St. George and Mainland, Highway 460, Crash 1944 Access Road, along all terrain trail, 48.50354'N, 59.21869'W, 290 m, 22.v.2013, on silicate rock, *J.W. McCarthy 2497* (UPS!, holotype).

ETYMOLOGY. – The species is named for the collector of the holotype, John W. McCarthy (b. 1958), S.J., a lichenologist working on the lichen biota of eastern Canada.

DESCRIPTION. – Hypothallus endosubstratal, I-, continuous with medullary hyphae. *Thallus* of areoles, angular to round, up to 1 mm wide and 0.5 mm thick, forming a continuous thallus, spreading by the division of areoles, and in part of the thallus parasitic on *Dimelaena oreina*, destroying the host and observed morphing out of the thallus of the host to form independent lichenized areoles. *Upper surface* dark reddish brown, green when wetted, matt, epruinose, rugulose. *Epicortex* 10–20 µm thick. *Eucortex* 20–30 µm, of poorly differentiated hyphae continuous with hyphal bands interrupting the algal layer, upper layer narrow, red brown, intensified in K, formed of the expanded apices of hyphae, ca. 5 µm wide, lower layer hyaline. *Algal layer* 50–100 µm tall, algal cells sparse, mostly 5–10 µm in diam., the upper stratum uneven, continuous under apothecia, interrupted with scattered hyphal bundles, mostly 5–10 µm wide. *Medulla* prosoplectenchymatous, ca. 100 µm tall, inspersed with substrate crystals not dissolving in K, obscuring hyphae, thin-walled, mostly 2 µm in diameter, continuous with attaching hyphae. *Apothecia* usually one per areole, immersed, with carbonized epihymenial accretions rising above the thallus surface up to 50 µm, red-brown, turning red in I and K. *Exciple* of radiating hyphae, expanding to ca. 70 µm wide at surface of thallus around the disc. *Epihymenium* between accretions red-brown, ca. 10 µm tall, also red in I and K. *Hymenium* 100–110 µm tall, the reaction to I uneven from persistent blue, greenish-blue, to immediately red in same section, K/I+ blue, paraphyses mostly 1 µm in diam., some 2 µm in diameter, lacking oil drops, branching, apices unexpanded. *Asci* cylindrical to clavate, mostly 70–80(–90) × (10–)15–20 µm, apical dome I-, K/I-, 100 or more ascospores per ascus. *Ascospores* simple, hyaline, 3–4 × 1–2 µm (n=30). *Subhymenium* I+ dark blue, 20–30 µm tall. *Hypothecium* narrow, prosoplectenchymatous, 10–20 µm tall. No pycnidia observed. Spot tests K-, KC-.

SUBSTRATE AND ECOLOGY. – Known from silicate rock that was well-rounded by long-term erosion and found in frost boils located between limestone beds (Figures 1B and 1C). The species is either an obligate or an opportunistic juvenile parasite on *Dimelaena oreina* (Ach.) Norman, developing an independent lichenized thallus.

DISTRIBUTION. – Currently only known from the type locality in Newfoundland in eastern Canada (Fig. 2). The collector was unable to find other specimens at the type locality or adjacent areas.

DISCUSSION. – The type species of *Polysporina*, *P. simplex,* has been found to be embedded in a clade together with the type of the genus *Acarospora* and thus the former should be treated as a synonym of the latter (Westberg et al. 2015). Prior to the publication of Westberg et al. (2015) we would have placed *A. maccarthyi* in *Polysporina* based on the melanized epihymenial accretions and slender branching paraphyses. It differs from all other species that have been placed in *Polysporina* in having apothecia immersed in the thallus rather than having a melanized lecideine margin.

Polysporina terricola Kantvilas from Tasmania is currently the only described species of *Polysporina* that has an epilithic thallus (Kantvilas 1998). That species differs from *Acarospora maccarthyi* in having an ecorticate thallus and especially in having a higher hymenium (170–240 µm vs. 100–110 µm tall) and melanized lecideine margin. *Polysporina terricola* is also terricolous rather than parasitic and saxicolous. Based on its morphology, *P. terricola* should be included in *Acarospora* due to its thin branching paraphyses, high hymenium, and its similarity to *P. simplex* and other taxa embedded in *Acarospora*. The name *A. terricola* H. Magn. was already given to a taxon from California (Magnusson 1929) and a new name is needed for *P. terricola.* It is here given the name *Acarospora tasmaniensis* K. Knudsen & Kocourk (see Appendix I). Although we attempted to revise the isotype of *P. terricola* published as having deposited in A. Vězda's herbarium which is now in PRA, the specimen could not be located. We did not revise the holotype because the original published description is more than sufficient to characterize the species, and to avoid subjecting a possibly fragile terricolous lichen known only from its type to overseas transport on loan.

The hymenium of *Acarospora maccarthyi* had variable reactions to I, even in the same apothecium. This may be due to the pigment in the epihymenium and epihymenial accretions, which is I+ red and contaminates sections when pressed under the coverslip in which case the species may have an amyloid hymenium. We look forward to new collections to study this problem as well as the variability of the species.

Based only on an examination of the holotype we cannot be sure if *Acarospora maccarthyi* is an obligate parasite on *Dimelaena oreina.* It could be an opportunistic parasite. Nonetheless, the endosubstratal hyphae invade *D. oreina,* destroying it, and forming independent brown areoles of *A. maccarthyi* morphing out the host. Three other species of *Acarospora* have been described as parasitic on *Dimelaena oreina.* They all differ from *A. maccarthyi* in lacking epihymenial accretions as well as other significant characters. *Acarospora anatolica* H. Magn. was described from Turkey and also differs from *A. maccarthyi* especially in having squamules with a distinct stipe (Magnusson 1929). *Acarospora nashii* K. Knudsen is parasitic on *D. oreina* as well as *Pleopsidium flavum* (Bellardi) Körber and was described from North America from Colorado, Nevada and Wyoming (Knudsen 2011). It differs from *A. maccarthyi* especially in having globose ascospores, mostly 3–6 µm in diameter. *Acarospora succedens* H. Magn. was originally described as a parasite on *D. oreina* but it is opportunistic parasite, rarely lichenicolous, and differs from *A. maccarthyi* especially in having gyrophoric and lecanoric acid (Knudsen 2011).

During this study we found that hymenium of the holotype of *Acarospora anatolica* had a wider range of height than was reported by Magnusson (100–135 µm vs. 120–135 µm tall) and as well as having I+ blue hymenium and subhymenium. The individual thallus units are growing among the areoles of *D. oreina* and are squamules with definite stipes (Magnusson 1929). It is here reported new from Pakistan in the Northwestern Himalaya from a collection made by Josef Poelt, the first report of this species since the type collection in Turkey (see Appendix II).

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APPENDIX I – A NEW NAME FOR *POLYSPORINA TERRICOLA*

***Acarospora tasmaniensis* K. Knudsen & Kocourk., nom. nov. pro.** *P. terricola* Kantvilas *non A. terricola* H. Magn.

Mycobank # 815454.

≡ *Polysporina terricola* Kantvilas, Lichenologist 30: 552. 1998. TYPE: **AUSTRALIA. TASMANIA:** 2 km W of Norfolk, 42°47'S 147°2'E, 90 m, on soil, 19.ii.1997, *G. Kantvilas 40/97* (HO[n.v.], holotype; PRA[not located], isotype).

APPENDIX II – NEW REPORT OF *ACAROSPORA ANATOLICA* FROM PAKISTAN

Specimens of Acarospora anatolica examined. –**TURKEY**: Lycaonia, in montibus Uzedjik-Dagh prope opp. Kaarapuncar, 1911, *J. Andrasovszky s.n.* (UPS!, holotype; BP [photograph!], isotype). **PAKISTAN:** Northwestern Himalaya, Baltisan, eastern Deosai Plateau, 3950 m, 35°05'N, 75°34'E, viii.1991, *J. Poelt s.n.* (GZU).